

Army R & D Achievement Awards Will Honor
52 In-house Laboratory Scientists, Engineers Page 16

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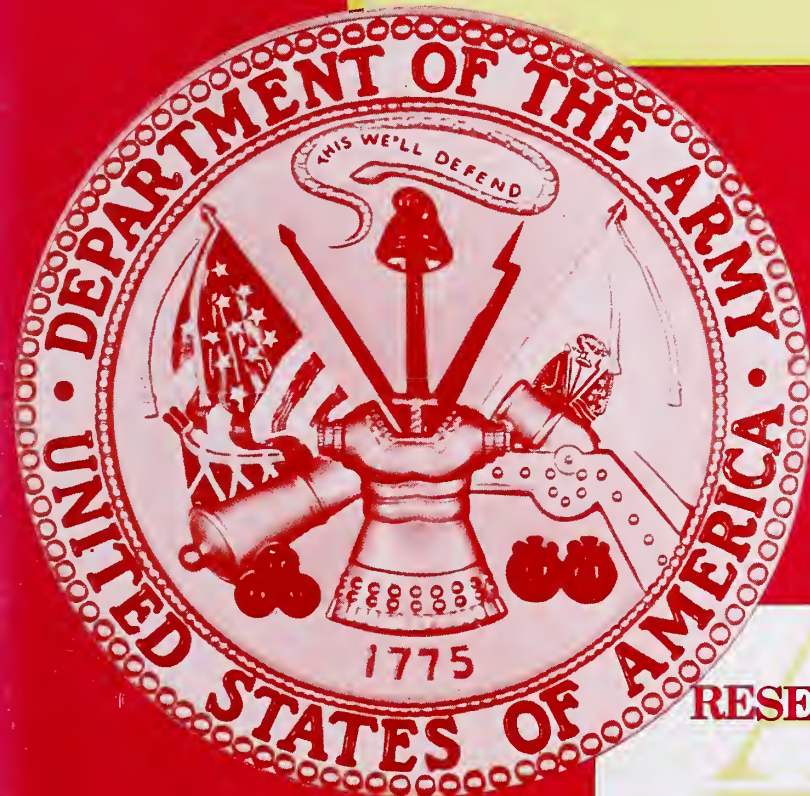
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DEPARTMENT OF THE ARMY
RESEARCH AND DEVELOPMENT
ACHIEVEMENT AWARD

FOR
TECHNICAL ACHIEVEMENT

Lieutenant General, GS
Deputy Chief of Staff for Research,
Development, and Acquisition



RESEARCH AND DEVELOPMENT

ARMY

July August 1975

SPEAKING ON...

Service for National Welfare . . .

Fixing of Priority Values for a Free Society

Secretary of Defense James R. Schlesinger addressed the issue of the traditional obligation of service to the nation and the values for which a free society must stand in speaking to the graduating class of The Citadel, a prestigious military school in Charleston, SC, on Armed Forces Day. Except for introductory remarks, the major portion of his address follows.



James R. Schlesinger
Secretary of Defense

... The world is still marred by violence; effective force remains in great demand. We must be prepared, but we can only be prepared as society permits. All of us should recognize, a nation, particularly a democratic nation, gets the military establishment that it deserves. Under these circumstances, it is imperative that we determine what are the values for which this society is to stand.

As a nation we have choices. We can insist on making the unfettered desires of the individual supreme. We can avoid encroachment on private wants; we can forego any major personal sacrifice or risk of life except as the individual volunteers it. But where does placing so high a priority on individual proclivities really lead us?

We have abundant examples before us in the domestic life of the nation. Pollution, whether by firms or individuals, is precisely the result of so exalting rights without responsibilities that the nation suffers as a whole, and so do we as individuals. No doubt there are private acts without external effects, but they are few and far between. Individualism without restraints can only lead to self-indulgence, nihilism and anarchy.

Even before that, individualism unconstrained by any sense of obligation can lead to the most dangerous delusions and self-deceptions. This is especially the case when undisciplined individualism encounters the realities of foreign policy and national security.

Most of us now recognize that the United States is not an unreachable island. Missiles and long-range bombers are stern reminders that the United States has now become vulnerable to attack. We also know that we have become part of an increasingly interdependent world. The oil embargo of a year ago was sufficient to underscore that point.

For at least some of us, this world is neither one from which we can retreat, nor an abode which we find particularly hospitable. Lacking the laws and institutions that shape the life of an individual nation, the external world may leave unrestrained power to the greedy, the foolish, and the malevolent.

In the absence of an effective international policeman on the beat, one should not move about unarmed in this environment. The meek need not inherit the earth but must always be prepared to defend their meekness.

But to be armed and reasonably safe in such a world requires people, notably

young people. Despite modern technology, despite nuclear weapons, despite the post World War II hope that "safety will be the sturdy child of terror, and survival the twin brother of annihilation," we have found no purely mechanical means by which to safeguard our interests and secure the peace. Without individuals prepared to serve the public good, we are without strength and vulnerable to any demand upon us.

To make that admission is to imply a responsibility, a duty, an obligation on the part of our citizens. But to concede the point flies directly in the face of untrammelled individualism. Avoidance of any such concession requires that construction of a myth about our role and responsibility in the contemporary world. And make no mistake about it, the myth has been in the making. Again and again, the refrain has been repeated that the United States is an imperialist power—with an imperial presidency.

World War II was the last "good" war. Since then, it is the United States which has provoked and initiated the cold war, the United States which has committed aggression, the United States which has put the existence of this fragile universe in jeopardy.

Accordingly, it is argued, we have no right to be strong. With a record such as ours allegedly is, weakness is a virtue; it keeps us from causing trouble. The individual has no obligation to serve or sacrifice. In fact, by this logic, the more selfish he is, the more he actually serves his country.

The supremacy of the individual: That is one way to go. But in the end it is a runious way. It links logic with emotion so crudely that some of Western civilization's highest values simply disappear from the calculation. But surely we continue to stand for something more than such indulgent self-interest.

Even those who so exalt this type of individual will also plead for justice and equity, which suggests that all of us still treasure other values besides personal self-satisfaction. And if justice is not without merit as a value, neither is duty to country.

In battle, it has been said, it is not syllogisms that will keep the reluctant nerves and muscles to their post in the third hour of the bombardment. The crudest sentimentalism about a flag or country or a regiment will be of more use.

If we are to have a society that works, and is worth protecting, we too must

embrace values that transcend individual self-interest. We cannot laugh at honor and still be shocked to find fraud in our midst. We cannot mock duty, sentiment, and self-sacrifice and expect this nation long to endure. We cannot lightly tolerate the work of tyranny abroad and expect to escape it indefinitely at home. We cannot reject generosity to those under attack in distant places and expect a greater generosity to flourish at home.

We have witnessed rampant individualism and narrow loyalties at work among the people of Southeast Asia; we now know their ultimate consequences only too well. We also remember what a united America dedicated to traditional values has accomplished.

Virtue may seem an outmoded word, almost tepid, though its original meaning was manliness. But virtue in the sense of voluntary observance of recognized moral laws is what we must restore if we are to deal successfully with the harsh challenges of the world around us. Justice Frankfurter described what is at stake more than 30 years ago.

"The ultimate foundation of a free society," he said, "is the binding tie of cohesive sentiment. Such sentiment is fostered by all those agencies of the mind and spirit which may serve to gather up the traditions of a people, transmit them from generation to generation, and thereby create that continuity of a treasured common life which constitutes a civilization."

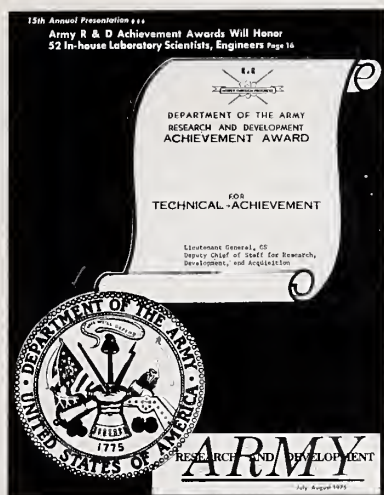
The Armed Forces historically have displayed the discipline, the pooling of effort for common purposes, and the willingness to sacrifice for a higher good that serve as a cure for self-centeredness and for individualism gone awry. We recently saw a display of these virtues in the evacuation of Phnom Penh and Saigon. . . .

Despite extraordinarily difficult terrain, a deliberating climate, and complex political constraints, it should be recorded that the Armed Forces of the United States succeeded in defeating the North Vietnamese both in small-unit actions and in large-scale combat. So effective were they, especially after the widely misunderstood Tet offensive of 1968, that Hanoi could not mount another major attack until the spring of 1972. And then it had to originate largely from outside of South Vietnam.

After still another defeat, largely inflicted this time by American air power, it took the North three more years—even with substantial external assistance and massive violations of the Paris Peace Accords—to prepare for a resumption of the assault. Only in 1975, and without

(Continued on page 21)

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ARMY

RESEARCH AND DEVELOPMENT

Vol. 16 No. 4

July-August 1975

ABOUT THE COVER:

Progress of 52 Army in-house scientists and engineers will be recognized through presentation of certificates with the 15th annual Research and Development Achievement Awards, considered the most prestigious honor bestowed upon Army in-house laboratory personnel. The Department of the Army bicentennial plaque (lower left) symbolizes America's rich heritage and proud traditions as the "Vanguard of Freedom."

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ARMY RESEARCH AND DEVELOPMENT NEWS MAGAZINE 1

Selective Scanner . . .

Pilot Plant Pollution Control Effort Announced

Initiation of a 5-year project designed to demonstrate the feasibility of disposing of industrial chemical wastes without pollution of the environment has been announced by the U.S. Environmental Protection Agency (EPA).

Financed by the EPA and the Minnesota Pollution Control Agency, the project will be conducted in the Minneapolis-St. Paul area. Believed the first large-scale pollution control effort of this type in the U.S., the pilot plant project will cost an estimated \$5,410,000.

The Cold Regions Research and Engineering Laboratory, an Army Corps of Engineers facility at Hanover, NH, has been doing pioneering research in this landfill technology for nearly three years. USACRREL Special Report 171, *Wastewater Management by Disposal on the Land*, a problem definition study, was published in May 1972.

In the Minnesota experiments, chemical wastes will be deposited in a specially designed landfill utilizing liners to prevent seepage. Liner materials now under consideration include concrete, asphalt, clay and plastic. Some wastes will be plant treated prior to disposal, using chemical fixation, encapsulation, neutralization, and similar techniques.

Industrial organizations, it is estimated, generate more than 10 million tons of chemical waste annually. These industries include metals, mining, tanners, electroplaters, metal finishers, organic and inorganic chemical plants, and pharmaceuticals.

HumRRO's FLIT Program Receives Accolade

The U.S. Office of Education has designated as one of 12 top reading programs in the United States a new functional training approach developed by the Human Resources Research Organization (HumRRO) for use by the U.S. Army.

Code-named FLIT (for Functional LITeracy), the program is designed to provide marginally literate soldiers with minimal literacy skills needed to meet military speciality reading requirements. Reading materials have been developed for jobs involving mechanical, clerical, communications, combat, medical and cooking duties.

Individuals entering the Army deficient in reading skills are currently provided a 6-week training course geared toward the fifth-grade level. The FLIT approach has demonstrated the capability of enabling marginally literate trainees to read at the seventh-grade level.

Culminating eight years of research and demonstration, FLIT is described in a new HumRRO publication, *Reading for Working*, available for \$5.95 from HumRRO, 300 N. Washington St., Alexandria, VA 22314.

CRREL Study May Cut Highway Construction Costs

Highway construction costs may ultimately be reduced if results of a long-term study (possibly 10 years) on an experimental test road prove satisfactory at the U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH.

Comparisons are being made between conventional construction, which features a granular base over the subgrade, and a new thick asphaltic concrete applied directly to a highly compacted 18-inch subgrade of native, silty soil. Road performance during frost melting periods is of major interest, and uniform blending of the subgrade by scraping and compacting appears to be a critical factor.

Measurements are being made of pavement strength, degree of frost heave, and depth of frost penetration. Pavements are being subjected to heavy truck traffic and repeated load tests during frozen, thawing and thawed conditions.

Test results thus far indicate a greater than normal degree

of frost heaving on the new nongranular base concrete. However, this heaving tends to be at a uniform rate, leaving a relatively smooth pavement surface. Following the spring thaw, the roadway returns to near normal.

The nongranular subgrade was found to have a high water content which does not drain readily, resulting in a reduction in the pavement's load carrying capability, and CRREL personnel are studying ways to provide suitable drainage. Use of a tough porous fabric overlain with a layer of porous asphalt below the asphaltic concrete surface has yielded good results.

New Hydraulic Fluid May Retard Aircraft Fires

Probability of in-flight and post-crash aircraft fires might be reduced greatly by using a new fire-retardant hydraulic fluid being tested by the U.S. Army Aviation Test Board (USAAVNTBD), Fort Rucker, AL.

Designed for use with the CH-47C "Chinook" helicopter, the fluid recently underwent cold weather qualification tests during a 2-month exercise at Fort Wainwright, AK. Cold weather tests also have been conducted by the USAAVNTBD at the McKinley Climatic Laboratory, Eglin Air Force Base, FL.

Temperatures and pressures of the hydraulic fluid were monitored at 33 separate locations in the helicopter. Automatic sensing and recording equipment tallied responses on tape.

Biodegradables May Ease Periodontal Disease

Biodegradable ceramic materials are being investigated as a potential treatment for periodontal disease by using afflicted human volunteers in experiments at the U.S. Army Institute of Dental Research (USAIDR), Walter Reed Army Medical Center.

Periodontal disease is a common cause of tooth loss resulting from weakened bone support in the jaws. No feasible methods of regrowing this supporting bone are currently available to practicing dentists. Transplanting bone marrow from other parts of the body is a complex process and plaster of Paris implants have not proved successful.

LTC Marvin P. Levin, chief of USAIDR's Department of Clinical Specialties, recently reported progress in animal experiments using implantations of tricalcium monophosphate, a non-toxic material which dissolves slowly in tissue, when he addressed an international biomaterials symposium.

Initial test results indicate, he said, that there is no adverse body reaction to the implant material, and that it stimulates formation of connective osteoid tissue around and within the implant. This tissue calcifies into bone and restores tooth-to-jaw contact. Experiments on human volunteers have been conducted for more than a year.

Ultimately, a ligament is formed to anchor the tooth firmly within the jaw, and the tricalcium monophosphate is carried away by specialized body cells. Although no definitive results have been achieved in humans, Dr. Levin said there is an indication that bone height does increase.

Initial research in the biodegradable ceramic material as a bone replacement material was conducted by COL L. Getter, chief, Division of Surgery, USAIDR, COL Duane Cutright, chief, USAIDR, and BG S. Bhaskar, former director of USAIDR.

ARMCOM, TRADOC Sponsoring APBI, Oct. 15-17

The U.S. Army Armament Command (ARMCOM), Rock Island, IL, and Army Training and Doctrine Command (TRADOC), Fort Monroe, VA, will hold their first jointly sponsored Advanced Planning Briefing for Industry, Oct. 15-17, at Moline, IL.

The classified briefing will provide industry with the scope and future of ARMCOM's long-range R&D programs relating to weapons, munitions, fire control and related items. Technological forecasts and state-of-the-art assessments, together with technical problems requiring solutions, will be presented.

The APBI is designed to be of interest to industrial execu-

tives, advanced systems planners, directors of research, development, engineering and production, and those concerned with formulation of long-range objectives. Participants must have a Secret security clearance.

Program and registration information can be obtained from the National Security Industrial Association (NSIA), Area Code 202-792-4750, or the American Defense Preparedness Association (ADPA), Area Code 202-303-3620. Both associations are headquartered in the Union Trust Building, 15th and H Streets N.W., Washington, DC 20005.

MASSTER Evaluating New Map Reading Device

Field survival capabilities of military personnel could be improved substantially with a new map reading device currently being examined by MASSTER (Modern Army Selected Systems Test, Evaluation and Review), Fort Hood, TX.

Termed the evasion chart viewer (EVC), the unit visually resembles a pocket size camera and is designed specifically for pilots and infantry soldiers.

Maps for the 35mm type are placed on spools and the larger 70mm viewer utilizes 3-inch slides called "chips." Both models have a transparent screen, an adjustable magnifying lens to view maps in their true scale, and a built-in light source.

EVCs have been field tested at various military services survival schools. Findings, along with current MASSTER test results, will be studied by the Defense Mapping Agency for potential use of the EVC as an escape and evasion aid.

WSMR Conducts Simulated Nuclear Blast Tests

TNT and AN/FO (ammonium nitrate/fuel oil) detonations, ranging from 5-ton to 500-ton, are being conducted during a Dice Throw High-Explosive Field Test Program scheduled to extend to September 1976 at White Sands Missile Range, NM.

Simulated nuclear blast and shock environments are created for experiments required by the Armed Services and Department of Defense agencies concerned with nuclear weapons effects. Since atmospheric nuclear detonations are prohibited by the Limited Test Ban Treaty, simulation produces blast and shock phenomena required for target response research.

The tests also will provide cratering and ground-shock information needed to confirm empirical predictions and theoretical calculations of impact on strategic structures, equipment and weapons systems, including how well tanks, wheeled vehicles, missiles, reentry bodies, missile silos and radars, withstand blast and shock.

Pershing's 15-Year Record Noted on 300th Firing

When the 300th Pershing missile was fired in May from the Utah Launch, 400 miles to impact at White Sands Missile Range (WSMR), Pershing Project Manager COL Samuel C. Skemp Jr. credited Pershing with records in three critical aspects of major military procurement programs.

Since the first contract was awarded to Martin Marietta in 1958, a net under-run of \$32 million has been achieved in total contracts of over \$1.5 billion; during the entire program, schedules were kept routinely and no major milestone was missed; and, most important, Pershing has proved a highly reliable system.

The first Pershing was launched Feb. 25, 1960, from Cape Canaveral, beginning a string of six successful firings in the maiden test series. Since that time, Pershing's record makes it a top contender for the most successful major weapon system developed by the United States.

Major modular improvements have been made to launch, control, transport, other ground support systems, and missiles. The automatic reference system/sequential launcher adapter (ARS/SLA), which has just gone into production, is considered a significant improvement in support equipment that provides

quicker reaction and more flexibility for the field commander. Under a contract awarded in 1974, a new terminal guidance system is expected to greatly improve its accuracy.

Pershing II in the advanced development phase is designed to provide even greater military effectiveness in its major role in defense of the Free World.

Pershing Modernized for Role in 'NATO Shield'

Modernization to upgrade capabilities of Pershing missile systems deployed overseas as a major part of "the NATO shield"—including conversion of guidance and control sections from analog to digital computer configurations—is complete after more than two years of effort.

Army Missile Command project manager for Pershing, COL Samuel C. Skemp Jr., credited participants in the massive refurbishing program with accomplishing "a tremendous job," involving coordinated support of contractor, U.S. Army, and German Air Force personnel.

Pueblo Army Depot had a major role in replacement of components and testing to insure satisfactory performance. C-141 and C-54 aircraft from Redstone Arsenal, AL, transported components from European installations and conversion elements from the Bendix and Martin Marietta Aerospace fabrication facilities.

During the extended period of refurbishing, the Pershing systems installed overseas had to maintain Quick Reaction Alert status, that is, no interruption of readiness for any contingency.

COL Skemp termed intricacies of integrating the over-all effort "staggering." All that remains to be done, he said, is to "clean up a few assets" that go into the Pershing stockpile in the U.S., a task programmed for completion this year.

Meanwhile, the Army is producing two new ground support equipment items, the Automatic Reference System and the Sequential Launch Adapter, that will improve system reaction time, reduce the human error associated with the missile laying operations and reduce training requirements.

SAM-D Records 12th Consecutive Successful Test

During its third of 16 planned missile proof-of-principle flight tests, the Army's SAM-D (Surface to Air Missile Development) demonstrated on June 19 its discrimination capabilities against a pilotless aircraft formation.

Involving an intercept of one of two Firebee drones flying in a defensive tactic, the test was the 12th consecutive successful SAM-D firing, with the first nine recorded in the Control Test Vehicle Program.

Project Manager BG Charles F. Means termed results an advance toward another major program objective for the Army air defense system for the 1980's. Planned tests can now be conducted against more difficult targets, including maneuvering aircraft and targets flying at low altitude, he commented.

Army Begins MICV Prototype Development Tests

Developmental testing of the first prototypes of the Mechanized Infantry Combat Vehicle (MICV-XM-723) is scheduled to begin in August at U.S. Army Aberdeen Proving Ground, MD.

Armed with a stabilized 20mm automatic cannon that enables the gunner to fire accurately on the move, and designed for an infantry squad to fight from within the vehicle, the MICV will replace the M113 Armored Personnel Carrier. Six ballistic-proof windows and firing ports are provided. Additional armament includes a 7.62mm machinegun and six 45-caliber machineguns.

The MICV is capable of moving over rough terrain at speeds exceeding 40 miles an hour, and is much more agile and maneuverable than the M113 APC.

In November 1972, following several years of feasibility studies, FMC Corp. was awarded an engineering development/productibility engineering and planning contract.

Desert Modular Camouflage Screen Type Classified

Standard type classification of a desert modular camouflage screen, which means that it has been evaluated after extensive testing as the most advanced and satisfactory of its type, has been announced by the Army Mobility Equipment R&D Center at Fort Belvoir, VA.

The screen is the second of three color blend configurations developed by the MERDC. A woodland version was type classified in 1972 and a snow version is undergoing final test and modifications.

Designed to provide concealment from visual, photographic and radar detection, the desert and woodland systems come in radar-transparent and radar-scattering versions. The radar-transparent model is used when concealed equipment includes radar or functions through the use of radar; the latter distorts radar signals to prevent identification of the concealed equipment.

Components include a basic hexagonal screen shaped to approximate the symmetry of natural objects, and a diamond-shaped filler screen to maintain symmetry when two or more hexagonal nets are joined to camouflage an area of about 900 sq. ft.

Fabricated of polyester twine garnished with polyvinyl chloride coating on both sides of a spun-bonded nylon base cloth, each screen is equipped with



MODULAR camouflage screen in foreground has gray and the one in rear tan patterns. Each is reversible for backgrounds in desert environments.

quick-connect-disconnect fasteners to permit rapid employment and removal. The screens are reversible to adjust to seasonal and color differences existing in nature.

A single camouflage screen can be erected in five minutes and about the same time is required to join additional screens for a multi-screen assembly.

A complete module with basic and filler net, repair kit and carrying case weighs 65 pounds. A 65-pound support system, which also has been type classified, consists of poles and batten spreaders to give the net a natural drape.

Army Testing Potential Replacements for M-151A2

In line with a \$145.7 million contract awarded recently for commercial vehicles to replace the Army's $\frac{3}{4}$ -ton and $1\frac{1}{4}$ -ton trucks—as part of the Army economy program—MASSTER (Modern Army Selected Systems Test, Evaluation and Review) is testing commercial vehicles at Fort Hood, TX, with a view to replacement of M-151A2 $\frac{1}{4}$ -ton trucks.

Four-wheel-drive vehicles being run through their paces during the 3-phase tests, which will continue until early 1976, include two American Motors CJ5s, two General Motors Blazers, two International Harvester Scouts, two Ford Broncos, and two Chrysler Ramchargers.

All the test vehicles are standard commercial models except for replacement of white-sidewall tires, installation of blackout kits and 12-volt power converter systems, and camouflage-pattern painting. Primary savings are expected

MERDC Contracts \$2.4 Million for Amphibian Vehicle Lighters

Construction of two amphibian air cushion vehicle lighters, capable of delivering a 30-ton payload, is the basis of a \$2.4 million contract announced by the U.S. Army Mobility Equipment Research and Development Center.

Intended for testing and evaluation, and scheduled for delivery in about a year, the vehicles will be produced by Bell Aerospace Division, Textron Inc.

Tests will be conducted at Aberdeen Proving Ground, MD, and Fort Story, VA, under auspices of the MERDC and the Army Test and Evaluation Command.

to result from use of standardized replacement parts.

During Phase I, each vehicle will negotiate fixed courses, including improved roads, cross-country movement, steep grades, curves, ditches, rocks, sand fords and obstacles. Test data will be used to evaluate ride and mobility characteristics in comparison to the M-151A2.

Phase II will consist of multiple runs over various terrains, operative crew maintenance, and loading and unloading the vehicle. This closed-loop course covers approximately 20 miles of primary and secondary roads. Each vehicle will be user-rated following course exposure.

All MASSTER test data will be forwarded to the U.S. Army Materiel Command for further evaluation prior to determining whether commercial vehicles will replace the M151A2.

Two standard 25-ton payload Voyager air cushion vehicles will be built at Bell Aerospace Canada Division, Grand Bend, Ontario, and shipped to the Bell plant in New York for modification to carry a 30-ton payload. An $11\frac{1}{2}$ -foot addition will make the over-all length of the craft 76 feet and the cargo deck 51 feet long. The width will be 33 feet.

Other modifications will include more powerful engines, improved propellers, an air management system and other improvements to the basic Voyager.

Air cushion vehicles have been under MERDC study for several years.

MERDC Facility May Advance 'Built-In' Camouflage Design

Camouflage studies directed to methods of concealing military equipment from radar detection will be conducted in a new facility being installed at the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, VA.

Scale models (one-tenth actual size) of tanks, armored personnel carriers and other materiel will be studied in the new MACROSCOPE, a compact indoor radar test range, to enable MERDC experts to design "built-in" camouflage treatment capable of deceiving enemy radar devices.

The MACROSCOPE, as a precisely controlled test site, will provide a detailed target analysis with greater accuracy and less expense than time-consuming measurements under varying field conditions, center officials said.

An experimental version of the facility, designed and constructed under an earlier contract issued by the MERDC, has been in operation at the contractor's plant, Dare Technology in San Diego, CA, since 1972. MACROSCOPE is scheduled for completion at Fort Belvoir by the close of 1975.

Designated by the U.S. Army Materiel Command as its lead laboratory for camouflage technology, the MERDC is responsible also for R&D, engineering, and initial production buys in 14 other fields of equipment acquisition to improve combat, mobility and logistic support equipment for the infantry soldier.

DCSRDA Approves Certificates

Issuance of two new certificates pertaining to the Army Reserve Research and Development Education Program was announced July 16 by the U.S. Army Logistics Management Center, Fort Lee, VA. The Army Deputy Chief of Staff for Research, Development and Acquisition approved the certificates.

LTG Howard H. Cooksey, DCSRDA, will address letters to the 464 current members of the program relative to the certificates—Department of the Army Certificate of Membership in the U.S. Army Reserve R&D Officer Career Program, and DA Certificate of Proficiency as an R&D Manager (Reserve).

AORS-XIV Scheduled Nov 18-20

Scheduling of the 14th annual Operations Research Symposium (AORS-XIV) at the U.S. Army Logistics Management Center, Fort Lee, VA, Nov. 18-20, was announced by the U.S. Army Materiel Systems Analysis Activity just as this edition was going to press.

AMSAA Director Dr. Joseph Sperazza said that, in accordance with a recent rotational agreement, AORS-XIV is being sponsored by the U.S. Army Materiel Command. The 1976 and 1977 meetings will be sponsored respectively by the U.S. Army Training and Doctrine Command, and the Department of the Army.

The theme of this year's meeting is "Operations Research—Applications to Real Army Problems." AMC Commander GEN John R. Deane Jr. has accepted an invitation to give the keynote address. About 300 Army, academic and industrial leaders are expected to participate.

Harry Diamond Development Center Alternatives Weighed

Establishment of the Harry Diamond Development Center will be decided by the Secretary of the Army early this fall, based on three alternatives proposed by an Army Materiel Command study group to implement recommendations by the Army Materiel Command Acquisition Review Committee.

Outgoing Secretary of the Army Howard H. Callaway, who has resigned to become President Ford's campaign manager, directed that Congress be thoroughly informed on all aspects of the proposals. Comments of Congress will be considered by the Army Secretary among decision factors.

Army Materiel Command study group representatives briefed congressional delegations from New Jersey, Maryland, Virginia and the District of Columbia on the proposals June 10 in Washington. All aspects of the impact upon constituents were explained and discussed.

Major HDDC gains listed in the study groups' report on reorganization are:

- Improve the Army's initial acquisition process and follow-on procurement.
- Consolidate radar; electronic technology and devices; lasers optics, and night vision; electronic warfare and SIGINT (Signal Intelligence) activities.
- Provide a larger base and greater flexibility for accommodating program changes and rebalancing.
- Attract and maintain a highly trained and competent staff.
- Become a major focal point for defense technology.
- Develop a more cost-efficient research, development and acquisition program.
- Reduce managerial layering and improve total effectiveness.

The report states: "Of equal importance to the concept are considerations of the costs and risks of the new organization, the principal ones being potential loss of competence, program continuity, and 'corporate memory.' Thus the proposed HDDC must minimize program disruption and personnel impact."

Proposal 1 would consolidate at HDDC headquarters Adelphi, MD—on the 137-acre site of the Harry Diamond Laboratories, adjacent to the Naval Weapons Surface Center—certain organizational elements from HQ U.S. Army Electronics Command, Fort Monmouth, NJ, and selected electronics R&D activities from the greater metropolitan area of Washington, D.C. This is essentially the AMARC recommendation to consolidate electronics R&D and acquisition in the National Capital Region (NCR).

Under this proposal, selected ECOM activities at Fort Monmouth, involving a total of about 1,800 employees, would be moved to Adelphi, in consideration of newly developed laboratory facilities considered among the finest in the U.S. Merged into the HDDC would be R&D elements of the Army Security Agency.

The Night Vision Laboratory would remain in place at Fort Belvoir, VA.

Proposal 2 would consolidate the HDDC at Fort Monmouth by moving about 1400 Harry Diamond Laboratories employees, Army Security Agency R&D activities, and the Night Vision Laboratory. This is termed the "geographical converse" of Alternative 1.

Proposal 3 would form an HDDC at Fort Monmouth, including headquarters, but with all the nuclear effects and simulation capability of the Harry Diamond Laboratories remaining at Adelphi and the Night Vision Lab at Fort Belvoir. Selected ASA R&D activities would be moved from Arlington Hall and Vint Hill Farm, VA.

All proposals (alternatives) would keep the Intelligence Materiel Development and Support Office (IMDSO) of the Electronics Command located at Fort Meade, MD, and the Office of Missile Electronic Warfare at White Sands Missile Range, NM, as elements of the Electronic Warfare Laboratory, Electronics Command. Similarly, the Atmospheric Sciences Laboratory would remain at WSMR.

Proposal 1 would require relocation of the project managers offices for REMBASS (Remotely Monitored Battlefield Area Surveillance Systems) and MALOR (Mortar and Artillery Location Radars) from Fort Monmouth to Adelphi, MD.

The AMC study group's analysis of merits of the alternative proposals considers facility assets and requirements, personnel aspects, programmatic aspects, and return on investment (ROI).

U.S., PRC Expand Scientific Information Exchanges

Exchange of scientific information between the United States and the People's Republic of China is expanded as a result of a program initiated in 1974. Seven Chinese groups will visit the U.S. this year and five U.S. delegations will tour research institutions in the People's Republic of China.

The exchange program is the result of an agreement of the U.S. Committee on Scholarly Communication with the People's Republic of China (PRC), and of the PRC. The committee involves the American Council of Learned Societies, the National Research Council of the National Academy of Sciences, and the Social Sciences Research Council.

Dr. Gordon E. Guyer, Michigan State University director of Cooperative Extension Service, is chairman of an Insect Control Delegation of 10 scientists who will leave for China Aug. 4 and return Aug. 29.

Members include Dr. Fowdin Gene Maxwell, coordinator, Environmental Activities, U.S. Department of Agriculture (USDA); Dr. Carl B. Huffaker, professor, Biological Control of Weeds, University of California at Berkeley;

Proposal 1 would require an estimated \$35.2 million for new construction and equipment, as compared to \$71.9 million for *Proposal 2* and \$17.5 million for *Proposal 3*. Location of the HDDC at Adelphi would place "almost all personnel in modern facilities." Construction could be completed by 1980. Leased space would be available in the Washington area during the interim.

New construction and renovation costs of *Proposal 2* (\$105.7 million) would be more than twice those of *Proposal 1*. Since leased space would not be readily available, consolidation could not be completed before 1980, the report notes.

Alternative 3 would cost an estimated \$17.5 million for new construction and \$8.3 million for renovation, and consolidation could not be completed before 1980. This plan would involve the least personnel turbulence, but *Alternatives 1* and *2* would save about 1½ times as many manpower spaces as *A-3*.

Alternative 1 is considered the most advantageous from a programmatic viewpoint, the study report states, since less transfer would be required. *Alternatives 2* and *3* would require transfer of 1.6 and 1.3 times, respectively, as many dollars as *A-1*.

From a Return-on-Investment long-range viewpoint, the order of preference in the study is *A-1*, *A-3* and *A-2*. Total one-time costs are \$47.3 million for *A-1*, \$115.7M for *A-2* and \$32.4M for *A-3*. Discounted savings of *A-1* through FY85 are estimated at \$50.1M as compared to \$32.5M for *A-2* and \$30.1M for *A-3*. Discounted costs through FY85 would be \$36.5M for *A-1*, \$84.5M for *A-2* and \$24.5M for *A-3*.

Dr. Donald E. Weidhaas, director, Insects Affecting Man, Research Laboratory, Agricultural Research Service, USDA, Gainesville, FL; and

Dr. Robert L. Metcalf, chairman, Department of Zoology, University of Illinois; Dr. Wendell Lee Roelofs, associate professor, Entomology, New York Experiment Station, Cornell University; Dr. Perry L. Adkisson, chairman, Department of Entomology, Texas A&M University; Dr. Harold T. Reynolds, professor, University of California at Riverside; Dr. Huai C. Chiang, professor, Insect Ecology, University of Minnesota; and Prof. Benjamin Schwartz, Harvard University.

PRC delegations visiting the U.S. are representative of the areas of solid state physics, molecular biology, communications techniques, petro-chemical industry, industrial automation, immunology, and the Scientific and Technical Association. In addition to the insect control delegation, the U.S. will send to China scientists interested in schistosomiasis, paleoanthropology, rural small-scale industry, and solid state physics.

Augustine Takes Over as Army Under Secretary

Under Secretary of the Army Norman R. Augustine was sworn into that position after serving in an acting capacity for one month following Herman R. Staudt's resignation, effective Apr. 30. Augustine had served as Assistant Secretary of the Army for Research and Development since Sept. 14, 1973.

Dr. K. C. Emerson, deputy for science and technology since Augustine established early this year seven deputies in major functional areas of the ASA (R&D), is serving as acting ASA (R&D).

Prior to appointment as ASA (R&D), Augustine had served as staff assistant to the Assistant Director of Defense Research and Engineering for Strategic Defensive Systems, and Assistant DDR&E for Tactical Missiles and Ordnance for Land Warfare. He also was a consultant to the Office of the Secretary of Defense, the Executive Office of the President, and Department of the Army. He has been a member of the NATO Group of Experts on Air Defense.

A graduate of Princeton University, Augustine has a BS degree (magna cum laude) and MS in engineering. He was elected to membership in Tau Beta Pi, Phi Beta Kappa and Sigma Xi fraternities.

Dr. Emerson is backed by more than 35 years of military and Federal Civil

Service, is an internationally known scientist, and has been associated with the Office of the Assistant Secretary of the Army for more than 14 years.

Among his career assignments have been research associate of the Smithsonian Institution, collaborator with the U.S. Department of Agriculture, adjunct professor at Oklahoma State University, and officer with the United Nations Command and the Military Armistice Commission. He has published more than 140 scientific books and articles.

Infrared Thermography Aids Protective Clothing Research

Infrared thermography is finding a new application as a tool to aid clothing designers in evaluating protective properties of garments for climatic extremes in research at the Natick (MA) Development Center.

Private textile and clothing industries providing logistic support for the Alaskan oil pipeline project have evidenced strong interest in the NDC experimentation. Infrared thermography, however, is a technology that has been used for some time by medical experts to examine blood flow in the early diagnosis of frostbite and serious burns, and more recently for early identification of cancerous tumors.

Scientists from the NDC's U.S. Army Research Institute of Environmental Medicine, and also the Clothing, Equipment and Materials Engineering Laboratory are using their "Copper Man," a precisely controlled mannequin electrically wired for measuring clothing heat loss at various temperatures.

Using a test glove, for example, an infrared camera with color film show the heat loss in a multicolored array. When black and white film is used, shades of gray indicate where heat is lost (lighter colors indicate the greatest degree of heat loss). Clothing designers are thus provided with an accurate picture for climatic extremes modifications.

John V. E. Hansen, director of the clothing laboratory, said: "Natick's research in this area represents one of the few applications of infrared thermography to clothing research in the United States. It introduces a new approach for the design and engineering of protective clothing systems and offers greater potential for the future spinoff of Army-developed items."

An official U.S. Army Medical Department (AMEDD) bicentennial emblem has been approved by the Department of the Army Bicentennial Office, Office of the Army Surgeon General, and U.S. Army Health Services Command.

The design centers on a gold caduceus inscribed on a white cross, both traditional symbols of the medical profession. Symbolic of the nation and its flag, the cross is stylistically edged in curved red and blue stripes.

AMC Lab Chiefs Hear R&D Leaders Discuss Changing Procedures

U.S. Army Materiel Command laboratory directors and commanders—in view of impending establishment of eight development centers that will impact upon current organizational structures—may have recently held their final meeting, per se, at the new complex of the Harry Diamond Laboratories, Adelphi, MD.

AMC Deputy Commander for Materiel Acquisition MG George Sammet Jr., to whom all development centers will report, made the opening presentation of the 2-day session, following welcoming remarks and a briefing on HDL capabilities and ongoing programs by HDL Director COL David W. Einsel Jr.

MG Sammet compared the current reorganization of the U.S. Army research, development, test and evaluation facilities to the broad-scale reorganization of the Army in 1962. Then the Army Materiel Command was created as the consolidation of the seven Technical Services RDT&E capabilities—except for those of the Surgeon General, and the Chief of Engineers.

"Some very important changes are in the wind," he said, "and more can be expected . . . but I believe that in the long run, despite our ups and downs, the trend for the future is up. . . . There are times when hard decisions are involved. Then it becomes a question not of taking the easier way but, rather, of what will work out best for the future."

Many complex sociological, economic and political considerations pertaining to many thousands of in-house laboratory personnel—but, above all, the essential objective of improved operational efficiency in view of decreasing financial resources—are involved in the decisions that must be made, he said. Some will be made this fall, others over an extended period as related to the need of continuing resources cutbacks.

The period ahead, MG Sammet stressed, will call for "true leadership to get done the job that must be done. . . .

(Continued on page 27)



LACV-30 (artist's concept), the Army's newest air cushion vehicle, which is designed to carry 30-ton payloads at speeds up to 50 mph, is expected to be delivered in early 1976. The LACV-30 is intended to replace amphibian vehicles currently used to transfer cargo from anchored ships to inland ports. The craft can cross barrier reefs, underwater obstructions, sand pits and beaches, rivers, snow, ice, tundra and other marginal terrain.

Schlesinger Announces Judges For National Resources Award

Six military installations selected from 235 competitors for the Secretary of Defense National Resources Conservation Award will be inspected by a panel of judges announced recently by Secretary of Defense James R. Schlesinger.

Established in 1962, the award is the highest honor presented to a military installation for management of natural resources programs and activities to enhance the operational environment.

The finalists are Army installations at Fort Ord, CA, home of the Combat Developments Experimentation Command, and Fort Pickett, VA; the U.S. Naval Air Station, Patuxent River, MD; U.S. Marine Corps Base, Camp Lejeune, NC; Barksdale Air Force Base, LA; the New Hampshire Satellite Tracking Station.

Selection committee members are Kenneth E. Black, Atlanta regional director, U.S. Fish and Wildlife Service; Henry R. Smith, director for Environmental Quality, Office of the Assistant Secretary of Defense (Health and Environment); Mrs. Rita C. McAvoy, New Hampshire Audubon Society; Richard D. Pardo, operations director, American Forestry Association; and

Ms. Sally M. Schauman, landscape architect, Soil Conservation Service, U.S. Department of Agriculture; Lloyd W. Swift, consulting biologist, National Wildlife Federation; and E. A. Rogner, Director for Installations Management and Planning, Office, Assistant Secretary of Defense (Installations and Logistics), who will serve as committee chairman.

'Formidable Fashions' . . . Edgewood, NDC Team Up on Body Armor

Inconspicuous body armor that provides protection against low-velocity bullets for law enforcement personnel, in the form of undershirts, sports coats, rainwear, golf jackets and similar garments, is largely a product of Edgewood Arsenal and U.S. Army Natick Development Center cooperative efforts.

Made of Kevlar 29—a lightweight material with the strength of steel for protective purposes and developed for military use and law enforcement officers under contract with Dupont Corp.—the new body armor is substantially attributable to scientists in the Biophysics Division of the Biomedical Laboratory at Edgewood Arsenal.

Natick Development Center investigators also are concerned with the Army Soft Body Armor Program, conducted for technology transfer in recent years in conjunction with the Law Enforcement Assistance Administration (LEAA) of the U.S. Department of Justice.

Edgewood Arsenal biophysics investigators turned their particular skills to the problem of ballistics and blunt trauma—the resulting injury that may occur when the bullet does not penetrate the skin. Directed and supported by LEAA officials, they have been working to produce low-cost external garments to withstand .38 caliber bullets.

Nick Montanarelli, a research psychologist at Edgewood, has been one of the key researchers since the LEAA program started in 1972. He was then a project manager, U.S. Army Land Warfare Laboratory, Aberdeen Proving Ground, MD.

Backed by more than 20 years of experience in body armor research and development for the military, the Natick R&D Laboratories (recently redesignated as the Natick Development Center), have been involved in the soft body armor program with design, fabrication, sizing (based on U.S. National Bureau of Standards and police survey anthropometric data), and environmental testing aspects.

"This has been a pure team effort," stated Edward Barron, head of the NDC Body Armor Group. "Experts in the field of physiology from the U.S. Army Research Institute of Environmental Medicine (located at the NDC) also provided invaluable assistance. There has been a large transfer of technology on the Kevlar 29 development to numerous law enforcement agencies and industrial firms throughout the country."

Currently, numerous state and local law enforcement agencies throughout the U.S. are involved in field testing the new protective garments. Federal law enforcement agencies have compiled their own data, based on the Edgewood Arsenal soft body armor program, and are in the process of purchasing thousands of garments for their agents in the field.

President Ford's press secretary, Ron Nessen, recently arrived for a news briefing at the White House wearing a special midnight blue protective vest. Edgewood Arsenal personnel had presented the vest to the Justice Department and it was turned over to Nessen, who joked that it had been sent by a JD friend "to protect him from the press."

Variations of commercially manufactured soft body armor



garments have been credited with saving the lives of several police officers in the line of duty. Robert Hoover was the only motorcycle policeman on San Francisco force wearing a protective garment when he was shot without warning during a routine traffic stop. The driver escaped but the bullet was found imbedded in the vest.

Commenting on Edgewood Arsenal's blunt trauma studies and the ability of the victim to respond after the initial shock of impact of such a bullet, Montanarelli said: "We have been involved in protection against knife and hand gun threats. It (the protective garment) could prove invaluable to workers in around-the-clock gas stations, cab drivers, liquor store owners, gun dealers and bank employees."

When asked what action would be necessary to keep the protective garments from being worn by criminals, Montanarelli said laws will be necessary to ensure that this protection will not be available to criminals—that the garments will be controlled for use only by law-abiding citizens.

Promotions Accent Opportunities for PMs

Career development opportunities inherent in U.S. Army Materiel Command project manager assignments are accentuated by the recent officer selection board's choices for promotion to brigadier and major general rank.

COL Lauris M. Eek Jr., chief of the AMC Office of Project Management, proudly pointed to the results in announcing a number of project manager reassignments. Four current and five former PMs were selected for brigadier general and four current PMs plus one former PM for promotion to 2-star rank.

Major general selections are BG Jerry B. Lauer, Heavy Lift Helicopter; BG Charles F. Means, SAM-D (Surface to Air Missile Development); BG Robert J. Malley, Munitions Production Base Modernization and Expansion; BG Gerd S. Grombacher, DCS (Army) Strategic Communications Systems; and BG George E. Turnmeyer, former project manager for Lance.

Brigadier general PM selectees are COL Grayson D. Tate Jr., LANCE; BG (recently promoted) Richard D. Lawrence, Saudi Arabian National Guard (SANG); COL Donald M. Babers, M60 Tank Production; and COL William P. Lewis, Single Channel Ground and Airborne Radio Subsystem (SINGARS).

Former PMs selected for BG rank are COL Robert L. Bergquist, who also served as special assistant for Project Management; COL John M. Shea, DRAGON; COL Alan A. Nord, Safeguard Ballistic Missile Defense System; COL Thomas Brain, Vehicle Rapid Fire Weapons System (Bushmaster); and BG (recently promoted) Stan R. Sheridan, former PM for M60 Tanks Production, who will become PM for the Mechanized Infantry Combat Vehicle in July.

Other PM reassignments announced by COL Eek are: BG William J. Hilsman, replacing MG Albert B. Crawford Jr. for Army Tactical Data Systems (ARTADS); COL Frank P. Ragano, Cannon Artillery Weapons Systems (CAWS) after serving as PM for the 2.75 Rocket System; COL John R. Brinton, replacing COL James H. Brill on the Heavy Equipment Transporter program; LTC Len Marella, 1¼ Commercial Truck Systems, replacing COL Joseph O. Lax Jr.

COL Frank J. Palermo Jr., succeeding COL John B. Hanby Jr. on HELLFIRE (Heliborne Laser Fire and Forget Missile System); COL Edwin M. Aguanno, succeeding COL William C. Rudd as PM for the Iranian Aircraft Program; BG Stan R. Sheridan, successor to COL James F. McCluskey for MICV; COL Chesley B. Maddox Jr., replacing COL Chester W. McDowell for NAVCON (Navigation Control Systems); and

COL James L. Tow, who takes over from COL Ragano on the 2.75 Rocket System; COL Louis Friedorsdorff replacing COL Robert J. Cottey on REMBASS (Remotely Monitored Battlefield Sensor Systems); and COL David E. Green, successor to COL David H. Souser on the Stinger missile.

A new Product Manager's Office for Aviation Systems Integration, headed by LTC John J. Top, was opened in June at HQ U.S. Army Aviation Systems Command, St. Louis, MO.

"Without having the effect of competition, the cutting edge of any organization grows dull. Bad practices develop; high costs result."

Dr. Malcolm R. Currie
Director, Defense Research and Engineering

Army Studies Blend of NV, Combat Lighting Devices

Modern Army Selected Systems Test, Evaluation and Review personnel at Fort Hood, TX, are investigating methods of effectively blending the revealing power of image intensification and thermal imaging night vision devices with conventional searchlights and flares for military operations.

MASSTER troops are engaged in a 2-phase experiment to determine effects of artificial illumination on the surveillance and target acquisition capabilities of soldiers using selected NV devices.

The objective, as described by test officer MAJ John D. Clements, is to acquire knowledge that will provide the "first real baseline data and serve as a basis for further program direction in battlefield illumination" while utilizing night vision devices in both offensive and defensive operations.

Phase one was completed recently as a joint effort conceived by researchers at Picatinny Arsenal, Dover, NJ, and

the Night Vision Laboratory, Fort Belvoir, VA. Troops were equipped with NV devices to observe targets consisting of a mix of tanks, armored personnel carriers, trucks and soldiers on foot.

Ability of the observers to detect and recognize the targets was evaluated by recording periods of time, ranges, levels of illumination, altitudes of flares and conditions of camouflage. Factors such as burning debris on the simulated battlefield were added to determine compatibility of observers and NV devices to light variations.

Phase two is programed for the spring of 1976 and will be supported by the Infantry School, Fort Benning, GA. This investigation will include effects of various combinations of NV devices and artificial illumination on the capability of a mechanized infantry platoon to conduct successful night operations.



AN/TVS-4 Medium-range Image Intensification Device is one of the surveillance sights being tested to evaluate the relationship between artificial illumination and night-vision devices at MASSTER.

Contract Orders Aircraft Vulnerability Reductions

Vulnerability of five U.S. Army aircraft to enemy fire will be determined in a 3-year program scheduled to begin early in FY 1976 under contracts estimated to cost about \$15 million.

Announcement of the program was made by the Eustis (VA) Directorate of the U.S. Army Air Mobility Research and Development Laboratory, Fort Eustis, VA. The statement explained that "advances in enemy air defense capabilities have dictated a crucial need to improve Army aircraft capabilities to withstand ballistic hits."

Goal of the Army Aircraft Vulnerability Reduction (VR) program is to develop, fabricate, test, and qualify modifications to the UH-1H Iroquois, AH-1G/Q Cobra, OH-58A Kiowa (Bell), CH-47C Chinook (Boeing Vertol), and OV-1D Mohawk (Grumman). Changes will reduce their vulnerability to 7.62mm API (Armor Piercing Incendiary), 12.7mm API, 23mm API, and 23mm HEI (High Explosive Incendiary) projectile threats.

Engineer James T. Robinson, Safety and Survivability Area, Eustis Directorate, explained that the VR program will be conducted in three phases. Detailed designs of the VR modifications will be prepared for review and approval by the government.

In Phase 2, prototypes of each VR modification will be fabricated and tested to verify design and compatibility with the aircraft.

In the final phase (prototype verification/qualification), prototypes will be fabricated and installed on aircraft to

conduct necessary ground and flight tests to obtain airworthiness qualifications.

Approximately eight contracts required for the program will embrace technologies as well as the Army and aircraft manufacturer conceptual studies. Successful completion of advanced and engineering development will lead to inclusion of these concepts in the current fleet of Army aircraft.

The program was initiated under sponsorship of the Aircraft Survivability Equipment Product Manager's Office (ASE-PMO) of the U.S. Army Aviation Systems Command, St. Louis, MO. The Eustis Directorate has been designated as the lead laboratory having complete technical and contractual accountability for the ASE/VR program.

Army Ballistic Research Laboratory tests on the current UH-1 tailboom have shown that damage tolerance to high-explosive rounds can be increased by changing the skin material in the horizontal areas of the tailboom, either by material substitution or by increasing the thickness of the material.

Proposed procurements are directed primarily to solving specific Army aircraft vulnerability reduction problems. The resulting program, however, will provide technology concepts that could have limited potential application to other federal as well as civilian law enforcement aircraft.

Design modifications will be based on currently available materials and techniques capable of entering engineering development within approximately 24 months. Results will provide answers to



James T. Robinson

the effects of the vulnerability reduction modifications on payload, range, speed, stability and control, fuel consumption, and reliability and maintainability. Aircraft compatibility, vulnerability reduction kit production cost, and the combat effectiveness and limitations of each modification will be determined.

The proposed procurements, to be processed on the basis of sole selection, will be coordinated with the Air Force, Navy, Defense Research and Engineering, and the National Aeronautics and Space Administration as required.

WES Concrete Authority Named American Testing Society Head



Bryant Mather, chief of the Concrete Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, was recently named president of the American Society for Testing Materials (ASTM).

Internationally known as an authority on concrete technology, Mather is also a Fellow of ASTM, and has received ASTM's Award of Merit, the Sanford E. Thompson Award and the Frank E. Richart Award. He has served as secretary and chairman of ASTM's Committee on Concrete and Concrete Aggregates, Committee on Cement, and Committee on Fire Hazard Standards.

Employed with the Corps of Engineers since 1941, he has an AB degree in geology from Johns Hopkins University. He has received Department of the Army Decorations for Exceptional Civilian Service and Meritorious Civilian Service.



New MICOM Test Facility Prompts Speculation

Curiosity and speculation are natural reactions to those who observe the unusual structure of a new U.S. Army Missile Command test facility believed the only one of its kind in the world.

T-PEES (denoting Triplane Elevated Evaluation System) is a 3-axis platform mounted atop a 150-foot tower at MICOM's Test Area One. When its existence and purpose were announced to the Army Research and Development Newsmagazine, a full-sized Firebee drone (MQM-34D) was perched at the peak.

Speculation as to the actual purpose of the strange sight has included comments such as "biggest weathervane I ever saw," "a giant smoke stack," "a barber pole," "a missile monument."

Immediate use of the new facility includes firing of 105mm and 155mm shells by the drone, under controlled positions, to test and evaluate miss distance equipment. Tests will also be conducted to determine antenna locations and study

system performance prior to an actual support mission.

Army plans also call for mounting a Variable Speed Training Target (VSTT) on the controlled platform. Expected to become the Army's primary training target for air defense systems and guns, VSTT will be used to test Shorads, Stinger, SAM-D, Chaparral, Hawk, Vulcan and Redeye.

Utilizing the remotely controlled tower, MICOM can simulate dives, climbs, maneuvering targets, and the desired roll, pitch and azimuth up to plus or minus 67 degrees. Anything up to a 1,000 pound target can be tested, obtaining accuracy to a plus or minus one foot.

In addition to miss distance information, the new facility is being used to evaluate laser ranging systems. Numerous other applications, including radar cross section programs, are anticipated. T-PEES Program Manager Earl Smaltz indicated that the U.S. Air Force has expressed interest in using the facility.

MoU Finalizes Selection of F-16 Combat Aircraft

Signing of a Memorandum of Understanding between the United States, Belgium, Denmark, the Netherlands and Norway June 10 signalized selection of the F-16 air combat fighter as the replacement for the F-104G aircraft under a co-production arrangement.

Representing the United States Government, Secretary of Defense James R. Schlesinger signed the MOU a day after notification by the Belgium government that it had joined in the action taken by other signatories late in May.

Under provisions of the MOU, the four European countries plan to produce up to 348 of the General Dynamics F-16 aircraft for their own use. The proposal permits aerospace industries in these countries to share in manufacture of

the aircraft for the United States, with third country sales participation up to a level at least 100 percent of the value of their initial program.

In addition to sharing in the co-production of the aircraft, the European countries and the United States will share in advantages of joint logistics, maintenance, and training facilities within the European theater.

This decision on the part of the consortium will enable NATO and allied forces to take a major step toward standardization of their weapons systems. The United States Air Force announced early this year plans to procure at least 650 F-16s, with a large number of the aircraft being deployed to European bases.

AMC Bicentennial Exhibit Van Slated for Nationwide Tour

In observance of the U.S. Army's 200th anniversary, Deputy Commander LTG W. W. Vaughan, U.S. Army Materiel Command, recently led ceremonies dedicating a mobile exhibit van which will tour the country during the nation's Bicentennial celebration.

LTG Vaughan emphasized that the Army should be viewed not only as part of the national defense structure but, rather, as a vital part of the whole American society. He noted that the Army's contributions, as depicted in the mobile exhibit, have not been limited to military engagements—that they have a direct bearing on the over-all welfare of the nation.

Army research and development programs, he said, have directly benefited the civilian community, particularly in medical research area. He said that the intent of the mobile exhibit is to capture the flavor of these R&D "spinoff" benefits to the civilian community.

Exhibit vans from the U.S. Navy, Marine Corps and Air Force will join the Army's unit for the 18-month tour to about 1,000 U.S. communities. The caravans will stress the theme, "History of the Armed Forces and Their Contributions to the Nation."

HQ AMC Names Coordinator

Ernestine Mangana, formerly employed with the Office of Staff Relations, Baltimore City School System, was recently designated as Federal Women's Program coordinator in the U.S. Army Materiel Command Equal Employment Opportunity Office.

Graduated with a BA degree in political science and history from Morgan State College in 1963, Mrs. Mangana served as Equal Employment Opportunity officer with the University of Maryland at Baltimore during 1972-74, and with the Maryland State Human Relations Commission from 1970-72.

Deane Letter Stresses Responsiveness to Aim Of 'User Satisfaction'

Project Hand-Off is programed to become increasingly meaningful to all U.S. Army Materiel Command elements involved in the materiel acquisition process, including research, development, test, evaluation, and close coordination with users of materiel.

AMC Commander GEN John R. Deane Jr. addressed a letter dated June 16 to all elements concerned, subject: Materiel Fielding and the AMC Commitment to User Satisfaction, in which he stated:

"One of the main goals I have set for AMC is the fielding of equipment that performs well in the hands of the soldier in the field. My aim is USER SATISFACTION and the recognition by the user that AMC is an aggressive 'can do' outfit that puts the soldier first in its priorities.

"Through a close and concerned relationship with the user during initial fielding and during operational usage of its equipment, AMC can reach the point where its responsiveness becomes a byword to the field soldiers. An absolute requisite for success in attaining these goals is an effective initial field operation. There is ample evidence of problems to indicate that we need to do a better job than we have done in the past.

"Under the impetus of a study, Project Hand-Off, this headquarters has evolved a program to improve the initial fielding of AMC materiel. Included in the program is the innovative idea that, for selected systems, AMC will make a commitment to the user. In the commercial marketplace this commitment could be termed a warranty. The purpose of this commitment is to demonstrate in the most practicable way possible that AMC stands behind its equipment and will leave no stone unturned in satisfying the soldier's needs. . . ."

GEN Deane concluded his letter by stating that implementation of Project Hand-Off is "intentionally product-oriented rather than process-oriented. It does not purport to cover any procedural detail, but instead points the way for upgrading AMC initial fielding operations. I expect you to restructure current fielding approaches and to move in the direction of this program.

"Initiative and judgment must be exercised so as to demonstrate unequivocally that each materiel fielder has constructed the most effective fielding scheme—one that matches the particular situation of the user. I will be looking for positive evidence that these concepts are well understood, that they have filtered down to 'doing' levels and finally, for the ultimate test, that soldiers are satisfied with the equipment.

"I am personally enthusiastic about this program, and I will be pleased to convey to such specific users and/or specific gaining command level, as you may consider necessary, my personal support and pledge of user satisfaction."

Contract Let for Helicopter Hydraulic Advances

Performance reliability and maintainability of helicopter hydraulic systems will be checked under a \$168,655 research contract awarded by the Eustis Directorate, Army Air Mobility Research and Development Laboratory, Fort Eustis, VA.

Larger helicopters have extensive hydraulic systems that power the flight controls, cargo winches and hoists, ground steering, wheel brakes and rotor brakes—systems known for high maintenance requirements and low reliability.

Boeing Vertol Co. will analyze deficiencies in current systems and identify areas which offer high potential for advancing hydraulic system technology, including improvements that could eventually show up in aircraft that are more reliable, safer, less vulnerable to attack, lighter, less costly to buy, and easier to operate and maintain.

Effects of significantly increasing hydraulic system operating pressures will be examined. R&D programs sponsored by the Navy showed that a change in system pressure could result in a hydraulic system weight savings of about 30 percent. This would represent about 200 pounds in a large helicopter, which, in turn, could result in a substantial acquisition cost savings per aircraft.

Gearbox Research Contract. Another Eustis Directorate \$97,000 contract to the Northrop Corp. calls for investiga-

tion of measurable parameters produced by helicopter gearboxes as they wear during normal use, including vibration, gearbox temperature, oil temperature and oil condition.

Better understanding as to how these parameters change as the gearbox wears will enable technicians to identify faulty gearboxes and schedule replacement before failures occur. This contract is part of the Army's research effort to improve aircraft diagnostic and inspection skills.

Transmission Assessment. As part of an ongoing program to advance the capability of assessing helicopter component conditions, the Eustis Directorate recently let an \$81,000 contract to assess whether a correlation exists between vibration signatures, oil debris collected from the filters, and internal transmission component condition.

To accomplish this, Boeing Vertol Co. will collect and analyze appropriate data from CH-47C helicopter transmissions returned for overhaul.

Pre-overhaul transmissions will be run on a test stand to obtain vibration signatures, disassembled under engineering scrutiny to document condition, and then overhauled. They will then be retested. Vibration signature will also be gathered on new transmissions. Inter-correlations will be made to ascertain whether a custom vibration signature is necessary as a diagnostic base.



COORDINATED EFFORT OF 3 NATIONS in developing an air defense system is evidenced in this picture of top representatives discussing a model of the Roland II missile launcher, a Federal Republic of Germany/France development, mounted on the U.S. Army GOER vehicle. European testing of the system in May-June will be followed by a U.S. test phase from August 1975 to February 1976, and further operational testing in France. Shown (l. to r.) are COL Henry Magill, project manager for the U.S. SHORADS (Short Range Air Defense System), Army Missile Command; Detlef Forndran, senior manager for Roland, German Ministry of Defense; COL Bertrand Robineau, director, Franco-German Program Bureau for Roland Development; and COL Pierre Givaudon, senior manager for Roland, French Ministry of Defense. A Memorandum of Understanding is being negotiated between the 3 nations.

Controversial Discovery: WSMR Research Conflicts With Neutron Spectrum Concepts

Results of a 6-year investigation in which neutron spectrum measurements were made at the White Sands Missile Range (WSMR) Fast Burst Reactor will be presented at a July 14-17 conference sponsored by the Institute of Electrical and Electronic Engineers (IEEE).

Physicist Harold L. Wright of the WSMR Nuclear Weapon Effects Branch, one of four coauthors of "Neutron Spectrum Characteristics of the WSMR Fast Burst Reactor," will present the tech-

nical paper at Humbolt State University, Arcata, CA. Wright feels some of the neutron spectrum research findings may be controversial in that they differ from prevailing concepts.

Wright and three coauthors used the latest, most precise neutron activation techniques, coupled with the computer code SAND II and new calibration methods, to conduct the study known as "Operation Hog Ring." John L. Meason returned to WSMR for the project. He was employed at the missile range before he became an associate professor of chemistry at the University of Arkansas.

Other coauthors are James Harvey, a candidate for a PhD degree in nuclear chemistry from Arkansas University, and Dr. John C. Hogan, a 1971 ROTC graduate of Arkansas, now serving as an Army first lieutenant at Redstone Arsenal, AL. While with the WSMR program, Hogan did graduate work at New Mexico State University through Associated Western Universities, a cooperative program of the Atomic Energy Commission (AEC) and WSMR. He received his PhD in 1974.

"These tests determined that the neutron spectrum is different than many nuclear physicists had thought," Wright commented. "It is harder by about 30 percent than previously reported; however, the previous error bars were about 25 percent. This difference will be significant in radiation effects testing at

fast burst reactors."

The difference in findings, he explained, is due to the new techniques employed and new instrumentation equipment used for the measurements. High resolution solid-state gamma ray detectors took measurements directly related to the calibrations. Some of the techniques were developed at WSMR.

The development program led to another discovery in which the team determined that the reported nuclear decay scheme of barium 140 was incorrect. "Gamma Ray Intensities for the Radioactive Decay of Barium 140 and Lanthanum 140," written by the same investigating team, will be published in a forthcoming issue of *Nuclear Science and Engineering*, the American Nuclear Society journal.

Operation Hog Ring findings were verified by additional measurements taken at WSMR and in work done by the Sandia Laboratories in Albuquerque. Related technical papers that support the WSMR investigations will be presented at the conference by Sandia Laboratories and by INTELCOM RAD/Tech.

The project was named in honor of the Arkansas Razorbacks mainly because, in the final phase of the measurements program, a large steel ring (known among the team members as the hog ring) was placed around the reactor core to hold the dosimetry foils used in determining the neutron spectrum.

Edgewood Awards \$25 Million

Production of a portable chemical alarm system for distribution to U.S. field forces in Europe is the basis of a \$25 million multi-year contract considered one of the largest ever awarded by the Edgewood Arsenal Procurement Directorate.

The 3-year contract provides for delivery, beginning within 15 months, of more than 13,000 units plus provisions for spare parts and test equipment. The Bendix Corp. Environmental Science Division in Baltimore was the successful bidder among five contenders for the contract. More than 70 manufacturing organizations were solicited.

The automatic system, which detects minute amounts of chemical vapors below lethal concentration, was developed under the guidance of scientists and engineers in Edgewood Arsenal's Directorate of Development and Engineering. An audible or combination audio-visual warning is given.

SISMS: An Expanded Acquisition Management System

The Standard Integrated Support Management System (SISMS) is a tri-Service standardized system for the planning, acquisition and management of logistic support resources for system/equipment programs.

SISMS was developed under the direction of the Joint Logistic Commanders (JLC) of Army Materiel Command (AMC), Navy Materiel Command (NMC), Air Force Logistics Command (AFLC) and Air Force Systems Command (AFSC).

Originally intended for use on multi-service aeronautical systems, SISMS was expanded by the JLC to cover, wherever practicable, all major items, systems and equipments. Approved by the JLC and indorsed by the tri-Service staffs, the system has been accepted by the Office of the Secretary of Defense as an authorized management system.

SISMS encompasses logistic and other related disciplines required to support adequately a weapon system and its equipment throughout its life cycle. The physical features of SISMS are:

- Joint Operating Agreements which detail the responsibilities and relationships of participating services involved in multi-service programs.

- Standard contract exhibits (work statements) for specifying a contractor's responsibilities.

- Data Item Descriptions (DID) for acquiring contractor data in a mutually agreed upon, standardized form.

Preceding the development of SISMS were several years of mounting Congressional and DoD pressures, establishing a trend toward increased service integration in the areas of acquisition and support.

Following its May 1967 report on Integrated Weapon Support Management (IWSM), based on experience gained with the F-4 aircraft, the JLC chartered the first SISMS panel. Its mission was to review the extent to which current integrated arrangements could be further applied to multi-service aeronautical systems; also, to establish principles, policies and procedures for a standard integrated support management system.

When it became apparent that portions of SISMS could be used on other types of systems and equipments, single or multi-service, the JLC agreed in 1970 to expand the applicability of SISMS and implement its concept as a management principle.

The Logistics System Policy Committee (LSPC), chaired by the Assistant Secretary of Defense (Installations and Logistics), recognized the system's potential advantages. In 1972 SISMS became part of the long-range plans for improvement of the DoD Logistic Systems Plan (LOGPLAN) 1972-1980.

The LSPC emphasized the need for the services to apply SISMS to all system and equipment acquisitions, and for the JLC to update the SISMS documentation which also was expanded to facilitate broader application to single and multi-service systems and equipments.

Army alternate member of the JLC SISMS Control Panel Charles Izac responded to *Army Research and Development Newsmagazine* questions:

Q: Why was SISMS developed?

A: The objectives are to reduce proliferation of different approaches to planning and managing the logistic support of multi-service systems/programs being imposed on contractors.

- Provide a single source of information with which the Joint Logistic Commanders may manage ILS programs.

- Permit the services to present a "single face to industry" through the application of common concepts, procedures and policies.

- Reduce the costs incurred by duplication in and among the services through the use of common logistics procedures.

- Integrate and standardize acquisition and logistics support disciplines into properly time-phased actions to ensure readiness of weapon systems and equipment; also, enhance support responsiveness through judicious planning and management.

Q: How is SISMS applied?

A: Each solicitation or contract award is stringently reviewed to ascertain the adequacy of SISMS application by the Army Materiel Command or subordinate command Data Requirements Review Board. Another check and balance system for SISMS is undertaken on the larger program contracts by the Army's Proposal/Contract Requirements Review Board.

Q: Are there instances where SISMS would not be feasible for application to a major program?

A: Absolutely. One example would be a contractor who has produced an item or service and the new award is for a follow-on buy. Why change? The contractor's familiarity with standard work statements and Data Item Descriptions (if current) is an asset that must be considered. If the contractor in a similar case used SISMS, it could cost the government more money for his services.

Q: What document describes SISMS?

A: The Joint Logistics Regulation AFLCR/AFSCR 800-24/AMCR 700-97/NAVMATINST 4000.38/MCO P4110.1A, Acquisition Management, Standard Integrated Support Management System, dated Mar. 3, 1975. An executive summary is contained in Chapter 1, Introduction and Concept.

Q: Does SISMS duplicate other management systems?

A: Not really. SISMS serves as an extension of the existing ILS system of DoD Directive 4100.35. SISMS also complements a Joint Logistics Commanders' (JLC) Memorandum of Agreement that provides the over-all management principles for conducting multi-service programs (AFSCF/AFLCR 800-2/AMCR 70-59/NAVMATINST 5000.10A, 4 Sept. 1973).

Q: To what extent do the other military services apply SISMS to system/equipment programs?

A: The Navy and the Air Force are

applying SISMS to their major acquisition programs. The Army, over the past 3 years, has been the foremost SISMS user. One contributing factor is a strong policy statement supporting SISMS issued in January 1972 by the former U.S. Army Materiel Command Commander, GEN Henry A. Miley, Jr.

Q: What specific areas of SISMS are of interest to the R&D community?

A: Four areas in the revised/expanded SISMS regulation are R&D oriented—Configuration Management, Data Acquisition Management, Engineering Drawings, and Engineering Responsibility. They establish uniform policy and delineate responsibilities through Joint Operating Agreements.

The services are working on three remaining chapters of the SISMS regulation—Logistic Support Analysis (LSA) Policy and Guidance, Support Equipment (SE), and Pre-Operational Support. Meanwhile, the Joint Logistics Commands are applying SISMS to various acquisition programs. The JLC SISMS Control Panel is continuing as task group monitoring the program.

Q: What does the future hold for SISMS?

A: SISMS will continue to be a way of life for logistic support planners. The concept will remain as an acquisition management function, irregardless of what you call the program. It must stand ready to accept change and, most important, retain its flexibility. Otherwise, the system will not be responsive to the Army's needs.

Q: How does industry benefit?

A: Industry profits as operating agreements, data and services to be furnished by a contractor have been standardized in language and format. Procedures developed, adopted by AMC, NMC, AFLC and AFSC, are usable by other DoD agencies. This is better understood by a look at some of the conditions experienced by contractors in dealing with the Department of Defense.

One example is evidenced by the Navy CH-53, the Air Force HH-53, and the Army CH-54. These aircraft share similar configurations or a high degree of commonality of components. As a result of having to comply with the different management systems of each service, the contractor had to prepare essentially the same data and services in three different ways.

For example, one service uses microfilm, another microfiche; they schedule and process engineering change proposals (ECPs) differently; they require their manuals and handbooks prepared in different configurations; and they require data on different forms, and specified at different time intervals.

Q: What does the term "one face to industry" signify?

A: It means that contractors can look to one set of standardized documentation in the acquisition area instead of complying with policy and procedures from each of the four logistical services.

Conferences & Symposia . . .

1976 ASC: 500 to 600 Responses Expected to Papers Call

U.S. Army in-house scientists and engineers desirous of competing for the distinction of presenting technical reports on significant research and development progress at the 1976 Army Science Conference must submit narrative summaries of proposals by Oct. 17.

Dr. Ivan R. Hershner, chairman of the Army Science Conference Advisory Group, has announced that the conference is scheduled at the U.S. Military Academy, June 22-25. The academy has been host to all of the conferences since 1957.

The purpose of the conference is "to provide a forum for presentation, critique and recognition of significant accomplishments by Army scientists and engineers." All presentations must be representative of original work performed in U.S. Army research and development installations.

Normally 500 to 600 proposals are submitted by hopeful authors. About 100 are selected for presentation and a chance to share in \$3,500 to \$4,000 in honorariums through funding by the Department of the Army Incentive Awards Program.

The most coveted distinction, however, is that of winning the Dr. Paul A. Siple Memorial Award, a large silver medalion initiated in 1970 to honor the memory of the U.S. Army's famed cold regions explorer. Dr. Siple's prestigious career began as a 17-year-old Boy Scout selected to accompany the first Byrd Expedition to the South Pole.

One-page narrative summaries of proposed R&D presentations must be submitted through command channels as follows:

Army Materiel Command proposals to Dr. Robert B. Dillaway, chief scientist, HQ AMC, 5001 Eisenhower Avenue, Alexandria, VA 22333.

Office of the Chief of Engineers, William B. Taylor, assistant to the Chief of Engineers for R&D, Forrestal Building, Washington, DC 20314.

Army Medical Service, Office of the Surgeon General, LTC

Hal F. Stolz, assistant chief, Research Planning Office, Medical R&D Command, Washington, DC 20314.

All Other Proposals—such as those from the U.S. Army Training and Doctrine Command, the Army Research Institute for the Behavioral and Social Sciences, and independent agencies—should be submitted to: Dr. Ivan R. Hershner, assistant director for Research Programs, Office of the Deputy Chief of Staff for Research, Development and Acquisition, Department of the Army, Washington, DC 20310.

Sponsored for the first time by LTG Howard H. Cooksey as Deputy Chief of Staff for Research, Development and Acquisition, the Army Science Conference will be planned by the Advisory Committee headed by Dr. Hershner. Other members: Dr. Dillaway, W.B. Taylor, LTC Stolz and Dr. Herman Robl.

Dr. Robl is chief scientist of the U.S. Army Research Office, Durham, NC, which will serve as executive agent for conference arrangements. Mrs. Anne G. Taylor, ARO, who has been associated with ASC arrangements for nearly 15 years, will again be a project officer.

Dr. Marvin E. Lasser, Army Chief Scientist and Director of Army Research, who has served as presiding chairman of the conference since 1966, will serve again in that role and also will chair the panel of judges for selection of programed papers.

search Institute at San Antonio, TX, submitted findings of the group on "Logistics R&D."

ASAP Chairman Lawrence O'Neill, Riverside Research Institute, New York City, reported on "Improved Light Antitank Weapon" and "Single Project Funding." Other presentations on ad hoc group studies were: Dr. Seth Bonder, president of Vector Research Inc. and a University of Michigan faculty member, "Fire Suppression"; Burton Brown, General Electric Co. at Syracuse, "Utilization of Intelligence"; and Howard Gates, a private consultant, "LORAN Manpack."

Briefings by Air Defense Center and School staff members included: "Air Defense Worldwide Deployment and Threat," MAJ Andrew Casani; "Air Defense Materiel," LTC Terence L. Shaw, who also spoke on "Air Defense Artillery Development"; "Air Defense Tactics," CPT Clyde R. Semmens; "Reliability and Maintainability Methodology," MAJ Lawrence B. Residori; "High Energy Laser Tactical Air Defense System and Effectiveness Analysis," MAJ Robert Kewley.

The ASAP fall meeting is scheduled Oct. 6-7 at the U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, for members and selected consultants who will submit oral ad hoc working group reports. LTG William C. Gribble Jr., Chief of Engineers, will be the host to the meeting, scheduled to acquaint participants with some of the major ongoing CofEngrs programs.

NDC Sponsors New England SIM Conference

Microbiological research conducted at the U.S. Army Natick (MA) Development Center (NDC) was explained recently to more than 50 members of the New England Society for Industrial Microbiology (SIM) at a meeting sponsored by the NDC.

Representatives of leading New England firms largely dependent upon microbiological technology and advances in the state-of-the-art for the production of manufactured goods, including foods, drugs, cosmetics and chemicals, participated.

Major subjects of discussion presented by NDC speakers included biodegradation of explosives and metal-working fluids, conversion of waste cellulose to glucose by enzymatic processing in a pilot plant to develop technology for large-scale operations, and a new procedure for rapidly detecting microbial contamination of food.

The New England Society for Industrial Biology fosters liaison among industrial, governmental and university laboratories engaged in specialized fields of applied microbiology.

ASAP Air Defense Review . . . Draws High-Level DoD, Army R&D Leaders

U.S. Army Scientific Advisory Panel members and consultants, along with numerous high-ranking Department of Defense and Army R&D leaders, shared in exchange of information at a recent Air Defense Review meeting.

Hosted by the Air Defense Center, Fort Bliss, TX, the meeting was highlighted by Norman R. Augustine's final appearance before the panel as chairman of its executive committee and as Assistant Secretary of the Army (R&D). He succeeded Herman R. Staudt following his resignation as Under Secretary of the Army. Augustine spoke on "Impressions of Association with the ASAP."

Themed on air defense weapons, tactics and the reliability and maintainability of air materiel, the meeting opened with welcoming remarks by MG CJ LeVan, commander of the ADC and commandant, Air Defense School.

Distinguished participants included: GEN John R. Deane Jr., commander of the Army Materiel Command; Deputy Chief of Staff for Research, Development, and Acquisition LTG Howard H. Cooksey; Deputy for Space Dr. Robert Kahal, Office of the Assistant Secretary of the Air Force.

Also, Assistant Director for Land Warfare Don Frederickson, Office of the Director of Defense Research and Engineering; Under Secretary of the Army for Operations Research Dr. Wilbur B. Payne; and Dr. Marvin P. Pastel, representing GEN William E. DePuy, Training and Doctrine Command.

Nine ASAP ad hoc working groups submitted reports. Two of the presentations were made by Dean Kenneth Clark, University of Rochester, New York, on "Predicting Soldier Success" and the "Army Social and Behavioral Sciences Program."

Dr. Marvin Gustavson, Lawrence Radiation Laboratory, gave the report on "Battlefield Effects" and former Army Chief of R&D (LTG, Ret.) Austin W. Betts, now with Southwest Re-

Army Judges Select 22 ISEF Winners for Trips, Summer Jobs

Twenty-five U.S. Army judges selected 11 Superior Achievement and 11 Meritorious Award winners from 396 finalists in the recent 26th annual International Science and Engineering Fair (ISEF) at Oklahoma City, OK.

Secretary of the Army Howard H. Callaway signed Certificates of Achievement presented to each of the Army winners by Army Materiel Command Deputy for Materiel Acquisition MG George Sammet Jr. He also presented gold medallions to the 11 Superior Achievement selectees and silver medallions to the 11 winners recognized by Meritorious Awards.

Additional honors conferred by the Department of the Army included the selection of two principal winners as U.S. Army representatives to the Japan Student Science Awards exhibit in Tokyo next January (known as Operation Cherry Blossom) and to the annual Nobel Prize ceremonies next December in Stockholm, Sweden.

The Superior Achievement winners also have a choice of summer employment in or an all-expense-paid one-week visit to the Army in-house laboratory of their choice, based upon special research interests in their ISEF exhibits.

The U.S. Navy selected a winner and an alternate for the Operation Cherry Blossom good will student ambassador trip to Japan. The Air Force and the Navy each selected a winner and an alternate to attend the Nobel Prize ceremonies.

Seventeen of the 22 Army selectees garnered various ISEF special awards from supporting organizations. Sponsored by Science Service Inc.—a nonprofit institution comprised of many of the nation's major industrial, academic, scientific and engineering professional organizations—the ISEF each year climaxes competition among high school students in more than 220 local, state and regional fairs, including some in foreign lands, i.e., Canada, Japan, Puerto Rico and Sweden.

The Army panel of judges included 14 from the Army in-house scientific community and 11 U.S. Army Reservists active in research and development programs. Members also were representative of 11 scientific disciplinary areas reflective of the Army's special interests in ISEF. Dr. Gordon L. Bushey, HQ AMC, chaired the panel. Anne G. Taylor, U.S. Army Research Office, Research Triangle Park, NC, was the ISEF Army action officer.

Project categories included the behavioral and social sciences, biochemistry, botany, chemistry, earth and space sciences, engineering mathematics and computers, medicine and health, microbiology, physics and zoology.



OPERATION CHERRY BLOSSOM award winner Holly Ann Barrett and Nobel Prize winner Jon Huppenthal, who will represent the Army in Tokyo and Stockholm, respectively, flank Army Materiel Command Deputy for Materiel Acquisition MG George Sammet Jr., during presentation of awards at the 26th International Science and Engineering Fair (ISEF).

Operation Cherry Blossom was initiated in 1963 by the Army, Navy and Air Force under sponsorship of the Japanese newspaper *Yomiuri Shimbun*. In 1972, the Air Force discontinued sponsorship of a student for the Japan trip, and joined with the Army and Navy in a new program in which each Service selects a winner to attend Nobel Prize ceremonies in Stockholm.

Operation Cherry Blossom winners are: (Army) Holly Ann Barrett, 18, Essex (IA) Community School, for her exhibit "Possible Effects of Induced Anxiety: A Comparative Study"; and (Navy) Darcy P. McGinn, 17, Alamogordo (NM) H.S., for "Investigation of a Coherent Optical Computer."

Miss Barrett also received a Certificate of Merit from the American Psychological Association. McGinn, who also was selected by the Army as a Superior Award winner, won the Optical Society of America's first-place award of \$100, and a third-place award of \$50 from the Society of Photographic Scientists and Engineers.

Cherry Blossom alternates are: (Army) Julia Ann Craig, 17, Leigh H.S., San Jose, CA, for "Analysis of Proteins Utiliz-

(Continued on page 23)

ARMY LABORATORY JUDGES. Front row (from left): John W. Barry, U.S. Army Dugway (UT) Proving Ground; Dr. Durwood B. Rowley, U.S. Army Natick (MA) Development Center; Dr. Jack Rinker, U.S. Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, VA; Dr. Joseph J. Del Vecchio, USAETL; Dr. Joseph Zeidner, U.S. Army Research Institute for the Behavioral & Social Sciences, Arlington, VA; Dr. William Shore, Rock Island (IL) Arsenal; Dr. Clarence A. Broomfield, Edgewood Arsenal Biomedical Laboratory, Aberdeen Proving Ground (APG), MD. Rear: CPT Kenneth A. Zych, U.S. Army Medical R&D Command, Washington, DC; Dr. Grant Gerhart, U.S. Army Tank-Automotive Command, Warren, MI; LTC Marie G. Wisler, Office of the Surgeon General, Washing-

ton, DC; CPT Charles P. Raffo, Edgewood Arsenal Biomedical Laboratory, APG, MD; LTC Robert F. Forsyth, U.S. Army Aviation Systems Command, St. Louis, MO; Dr. Gordon L. Bushey, U.S. Army Materiel Command HQ, Alexandria, VA.

ARMY RESERVE OFFICER JUDGES. Front (from left): MAJ John A. Replogle, MAJ James V. Mergenhausen, MAJ Salvador L. Comacho, MAJ Gerald H. Elkan, LTC Aubrey F. Messing, assistant for Reserve Affairs, Office of the Deputy Chief of Staff for Research, Development, and Acquisition, Department of Army, Washington, DC. Rear: LTC Harold Zallen, COL John V. Perry Jr., LTC Robert E. Long, CPT Ronald D. Stricklett, MAJ States M. McCarter, MAJ Cyrus M. York. Not shown is LTC John R. Montgomery, unavailable for picture.



Famed Nuclear Scientist Details Energy Crisis Views



FIVE NATIONAL JSHS WINNERS of a 2-week trip to London, England, to participate in the International Youth Science Fortnight are shown with BG Frederick Smith (left), dean of the Academic Board, U.S. Military Academy, and COL Lothrop Mittenthal, commander, U.S. Army Research Office, Research Triangle Park, NC, who presided at the opening session. The students are (l. to r.) Mark E. Bailey, Erlanger, KY; John C. Holmes, Milwaukee, WI; Jayne Thorsen, Bussey, IA; Jayne E. Stoffregen, Toledo, OH; and David Shapiro, Ladue, OH.

National Junior Science and Humanities Symposium student participants who win a visit to the U.S. Military Academy as "VIP" guests for three days invariably depart with inspirational, challenging, changing influences on career goals.

Still, the recent 13th annual NJSHS may have entered an enduring bid for all-time program peak recognition by providing unforgettable memories to about 300 of the nation's exceptionally gifted high school science students, some of their teachers and 37 regional NJSHS directors.

Internationally renowned U.S. nuclear scientist Dr. Edward Teller, known as one of the "founding fathers" of nuclear theory leading to the diversified impact of this technology—such as nuclear power plants as one of the most immediate answers to the world energy crisis—spoke on "Energy: A Program for Today." BG Frederick Smith, dean of the Military Academy, introduced Dr. Teller.

After holding his audience enrapt for about an hour, he abruptly left the podium to go to the center of the big stage of Thayer Hall's North Auditorium. There he sat, with his legs hanging over the edge of the stage, as he talked person-to-person during a half hour of questions and answers.

Dr. Teller's long-sustained interest in supporting the Army-academia, industry sponsored Junior Science and Humanities Program—initiated as the keynote speaker at the first NJSHS in 1963—was demonstrated when he responded to sustained questioning as students crowded around as he left the stage.

Other remarkable speakers, however, prevented Dr. Teller's



DISTINGUISHED NJSHS participants, caught by camera as part of an informal discussion group, are LTC James Vick, Edgewood Arsenal—known as the U.S. Army's leading authority on poisonous and nonpoisonous snakes, venoms, toxins, antidotes and other research aspects—and Dr. S. David Bailey, director, Food Service Laboratory, Natick (MA) Development Center, and for many years a JSHS leader.



WORLD RENOWNED NUCLEAR SCIENTIST, Dr. Edward Teller, who retired in mid-June at age 67 after 21 years as a professor at the University of California and 15 years as associate director, Lawrence Livermore Laboratory, is surrounded by enrapt students at the National Junior Science and Humanities Symposium. They swarmed around him after he stepped from the stage after addressing them on "Energy: A Program for Today" for nearly an hour and responding to inquiries during more than a half hour of questions and answers.

contribution from making the 13th NJSHS a "one-man show." Dr. Norman J. Doorenbos, introduced by Army Materiel Command Deputy Commander for Materiel Acquisition MG George Sammet Jr., stimulated little less eager response as he spoke on "Cannabis (marijuana)—A Mysterious Plant."

Dr. Doorenbos is chairman, Department of Pharmacognosy, University of Mississippi, and his address covered many fascinating areas of drugs and food toxins research.

"The Social Settings of Science" was the topic of Dr. Seymour Mausekopf, associate professor of history at Duke University, Durham, NC. He traced the origins of science and its industrial and social impact to the early ages.

Introduced by Dr. Marcus Hobbs, professor of chemistry at Duke University, chairman of the JSHS Advisory Committee, and ardent supporter of the JSHS Program since its early days, CPT James H. Stith, U.S. Military Academy professor of physics, became the first black educator to make an NJSHS major address. His subject was "Science in the 1980s," a documented insight into some of the remarkable scientific progress that can be anticipated.

(Brief summaries of two featured presentations are carried at the conclusion of this article.)

EIGHT PANEL DISCUSSIONS gave students an insight into fascinating aspects of science. They had a choice of participating with U.S. Military Academy faculty members and other outstanding educators and scientists in discussing a variety of areas of potential career interest.

Dr. Doorenbos and LTC James Vick, Edgewood Arsenal, MD, made presentations on "Poisonous and Venomous Animals." This science area is part of Dr. Doorenbos' research effort at the University of Mississippi. LTC Vick is renowned as the U.S. Army's top investigator of poisonous and nonpoisonous snakes, venoms, toxins and antidotes. His presentation proved of great interest to students.

"Energy" was the topic of a panel consisting of Dr. David Bailey and Dr. Robert Andren, both of the Army Natick (MA) Development Center, and Miss Carolyn Merry, Army Corps of Engineers' Research & Engineering Laboratory, Hanover, NH.

"Genetic Engineering," concerned with the unfolding mystery of DNA biology—the possibility of someday controlling basic physical characteristics of birth—was moderated by Dr. Charles J. Christens, University of Minnesota, and CPT Richard Hjorth, Walter Reed Army Medical Center.

TOO TIRED TO STAND LONGER, after nearly an hour on the podium, Dr. Edward Teller created this unforgettable memory of him for his eager audience by taking center stage during a lengthy response to questioners.



"Food and World Politics" featured presentations by LTC Robert Chenoweth and CPT Gary Moon, both of the U.S. Military Academy (USMA), Dr. John H. Baker, Southern Illinois U., and Dr. Kenneth Hall, University of Connecticut.

"Weather Modification" discussion followed presentations by MAJ John Dickson, USMA, Walter C. Conover, Army Electronics Command, Fort Monmouth, NJ, and Alfred Hulstrunk, Department of Environmental Conservation, Albany, NY.

"Medical Frontiers" featured presentations by Dr. Herbert L. Ley, Jr., former head of the U.S. Food and Drug Administration, former staff member in the Life Sciences Division of the Office of the Chief of R&D, Department of the Army, and a prominent U.S. Army Reserve R&D colonel, along with Harry L. Froehlich, a top scientist at Edgewood Arsenal.

"Materials," a topic concerned with the complexities of research to blend metals, ceramics and other materials into lighter, stronger, specialized alloys or composites for military and civilian needs, opened with presentations by CPTs Tom Farewell and Mike Root, USMA, and Samuel Horowitz, Hermes Engineering.

"Continental Drift"—the changing shorelines and conformation of continents throughout the ages caused by physical upheavals or sinking of the earth into the oceans—featured panelists Dr. Robert Anstey, Farmington (MA) State College, MAJ Nils Johannesen, USMA, and Dr. Maynard Miller, Michigan State University.

Classroom and Laboratory Visits enabled students to gain first-hand knowledge of the USMA academic program by talking to cadets at work in physics, chemistry, electrical engineering, mathematics, the earth, space and graphic sciences, history, mechanics, and computer technology. Cadets also joined with NJSHS participants as they dined daily in the West Point Open Mass. Rain prevented the ever popular full-dress parade of USMA cadets.

Multimedia Presentations. Judged by resounding applause and rollicking laughter, NJSHS participants thoroughly enjoyed two films prepared by USMA students interested in the graphic arts. "The Good Earth" was a sharply satirical treatment of pollution of the environment throughout the United States, based substantially on clippings (with pointed narrative comments) from all types of news media. The second film was in a serious vein, "Education for Leadership," highlighting the training of USMA graduates for military careers.

Music to Long Remember resounded through the USMA's huge gothic chapel when Dr. John A. Davis Jr., USMA organist for more than 20 years, demonstrated his masterful touch at the keyboard of the largest church organ in the world, with more than 18,000 pipes ranging from one inch to 32 feet long. This concert always is one of the NJSHS popular attractions.

CLIMAX: TRIPS TO LONDON. The exceptionally high quality of technical presentations by students—one representative of each of the 37 regions this year, involving selection from more than 7,000 participants—was noted by more than 20 academic leaders and senior scientists who served as judges.

MG George Sammet Jr., a strong supporter for many years of the International Science and Engineering Fair, and the JSHS, as a Department of the Army representative—usually

as a presenter of awards or guest speaker—also commented on the excellence of all the presentations he heard.

Five students were selected, based on their presentations, for a trip to London, England, to participate in the International Youth Science Fortnight, July 30 to August 14. Their escort will be Dr. Edward Pizzini, a member of the U. of Iowa faculty, selected from the regional directors.

The student winners and titles of presentations are: *Jayne Thorsen*, 17, Twin Cedars High School, Bussey, a small farming community near Hamilton, IA, "How Do Diet and Stress Relate to Hypoglycemia?" *Mark E. Bailey*, 16, Lloyd Memorial H.S., Erlanger, KY, "The Plasma Display."

David Shapiro, 17, Horton Watkins H.S., Ladue, MO, "Thin-layer Chromatography, as a Method for the Analysis of Waste Water Samples for the Presence of Carcinogens." *Jayne E. Stoffregen*, 18, St. Ursula Academy, Toledo, OH, "The Effects of Sodium Salicylate, Serpasil, Apresolinem Cedilanid-D and Lanoxin on Chromosomes of Human Lymphocytes in vitro." *John C. Holmes*, 17, Nicolet H.S., Milwaukee, WI, "The Desulfurization of Coal Using Microorganisms."

Brief Biographies: Jayne Thorsen, a 5' 4" blonde, was raised on a farm with two younger sisters. She has been interested in scientific research since she was a freshman—built a laboratory in her home. She won a trip to the annual meeting of the American Association for the Advancement of Science as a result of her presentation at the 1975 University of Iowa regional JSHS.

Intent on a career in biochemical research, Jayne devotes much of her spare time to research but manages to squeeze in membership on the debate team, Spanish Club, Drama Club, Lettermen's Club (won her letter in softball) and Science Club. She has served as vice president of Students for Educational Services.

David Shapiro is a tall, husky youth given to easy laughter whose serious side shows only when he talks about scientific interests and goals. He plans to enter Massachusetts Institute of Technology this fall as a student in computer sciences, and became active in research as a H.S. sophomore.

One of his Chinese friends, Tony Chen, won several science awards, David explained, and "I was much impressed by him. Anthony Kardis was the finest teacher I have ever had and I studied advanced chemistry with him as a senior." He started research on causes of cancer with Kardis, and did research during the summer at the Monsanto Chemical Co. library. David's father is a former hotel manager, his mother a former secretary. David's hobbies are coin collecting, sailing ("loves it") and tennis.

Mark Bailey became interested in electronics research as a seventh grader and entered his first science fair a year later in Cincinnati, finishing as one of five finalists in the physical sciences. A year later he started "building small computers," and as a sophomore designed his first plasma display. As a junior, he was a winner in the Kentucky JSHS regional and was selected as an alternate to the NJSHS in 1974.

Mark is the son of a widow (father dead for seven years) with 13 children (6 boys, 7 girls). She works as manager of a fabrics store in Covington, KY, to support them. Two of his older brothers are in the Air Force, one as a crew chief for Phantom jets, the other as an X-ray technician. Mark is trying to obtain a scholarship for a career in electrical engineering. Hobbies: Plays organ, "dabbles with guitar and piano," school photographer, plays baseball, makes his laboratory equipment.

Jayne Stoffregen (like Jayne Thorsen) impressed this interviewer as an ambitious, serious-minded girl with exceptional potential for her planned career in biomedical engineering. She intends to enter Northwestern University this fall. Jayne received superior ratings in all science fairs she has entered, starting as an eighth grader. This year she won first place in the Ohio JSHS, took honors in the Westinghouse Science Talent Search, and garnered awards in five other symposia.

"People have always been wonderful in helping me," she said. She was permitted to work with the chief pathologist in the Cytology Laboratory at St. Charles Mercy Hospital in Toledo. She also worked with professors of pharmacy and biology at the U. of Toledo. Winner of a \$150 Soroptimist Youth Award this year, she served on the Student Council for the past two years, was secretary of the junior class, and played viola with the H.S. orchestra and Toledo Youth Orchestra.

John Holmes became interested in science as a sixth grader but limited



MANY LITTLE KNOWN FACTS about marijuana and its potentially permanent damage to the brains of users, along with other harmful effects to vital organs, were disclosed by Dr. Norman J. Doorenbos, chairman of the Department of Pharmacognosy at the University of Mississippi, when he gave a featured address at the 13th National JSHS. Dr. Doorenbos is flanked by MG George Sammet Jr., Army Materiel Command Deputy Commander for Materiel Acquisition, LTC Robert L. LaFrenz, U.S. Military Academy project officer for the NJSHS, and Don Rolins, director, Duke University, JSHS Office.

(Continued on page 31)

Recognize Progress of 52 In-House Scientists, Engineers

Presentation of the 15th annual Research and Development Achievement Awards, the most prestigious recognition the U.S. Army bestows annually upon in-house scientists and engineers for investigations considered of exceptional merit, will be made by top leaders of R&D during coming months.

Winners will include 9 individuals and 11 groups, a total of 52 persons. Award ceremonies, probably spread over a period of several months to accommodate the schedules of presenting dignitaries, will be made at the laboratories where winners are assigned.

Except for two individual awards to U.S. Army Corps of Engineers and three to Medical Service Corps personnel, all winners are assigned to U.S. Army Materiel Command laboratories. AMC controls about 80 percent of all U.S. Army labs. The award consists of a wall plaque and a cast-bronze desk decoration.

AMC Commander GEN John R. Deane Jr., his deputy LTG Woodrow W. Vaughan, Deputy Chief of Staff for RDA LTG Howard H. Cooksey, his deputy MG Peter G. Olenchuk and AMC Deputy Commander for Materiel Acquisition George Sammet Jr. will share in making awards. Chief of Engineers LTG William C. Gribble and Surgeon General LTG R. R. Taylor will present awards in their Commands.

Army Chief Scientist and Director of Army Research Dr. Marvin E. Lasser was chairman of the panel of judges that selected the winners from nominations made by laboratory chiefs and approved by commanders of the Army Materiel Command, the Chief of Engineers, and the Office of the Surgeon General.

Other DCSRDA judges included COL John E. Wagner, deputy director of Army Research; Dr. Vitalij Garber, former scientific adviser to the Directorate of Weapon Systems who recently joined the staff of the Energy R&D Administration; Dr. Ivan R. Hershner, assistant director for Research Programs; Dr. Richard L. Haley, scientific adviser to the director of Combat Support Systems; and Dr. William C. McCorkle Jr., scientific adviser to the director of Weapons Systems.

Achievements of those selected for awards ranged from research and development of a solid propellant for use in the Army's high-energy laser program to producing a safe and effective vaccine for immunizing against Venezuelan Equine Encephalomyelitis. The vaccine was used to bring under control a 1971 epidemic that raged through Mexico and the southwestern U.S.

Five researchers were cited as a team for developing a mini-laser rangefinder. A 4-man team will be honored for a new compressible fluid recoil mechanism for tank armament, and a 3-man team for developing advanced techniques for disposal and demilitarizing of explosives.

Other awards went to teams for product improvement of impact switches for projectiles, devising new methodology for inspection of high-fragmentation steels, and for designing a new cannon for close-support artillery.

Individual accomplishments ranged over many scientific disciplinary areas, such as the Army's Common IR Module Program, satellite communications, non-lethal weapons for use in combat and in control of civil disturbances, infrared guidance for air defense missiles, and aviation crashworthiness and crash injury research.

Winners of R&D Achievement Awards, listed within the major command, sub-command and/or installation at which they are employed, and brief excerpts from their nominations follow:

ARMY MATERIEL COMMAND

U.S. Army Electronics Command (ECOM), Fort Monmouth, NJ. A 5-man team developed a versatile, ultralight-weight mini-laser rangefinder, reportedly about five times lighter, that will cost about 10 times less than comparable devices currently used by the Army. Individual modules provide flexibility of integration into, or use with, any military equipment requiring accurate range information out to 2,000 meters. A dramatic improvement in the first-round hit capability has been demonstrated.

Team members credited with this achievement, which also could serve as the basis of a man-portable land navigational system or as an inexpensive altimeter for Army aircraft, are *Michael R. Mirarchi, Frederick A. Kobylarz, Ronald Wright, Henry Saphow and John Ransom.*

Mrs. Joy L. Arthur was selected for "significant contributions" to missile electronic warfare, specifically for investigations on unconventional chaff, at the Electronic Warfare Laboratory, Office of Missile Electronic Warfare, ECOM. Her research resulted in the theoretical description of the characteristics of materials needed for a much more effective type of chaff.

The award citation states that she overcame the chaff dispensing problem by synergizing two diverse technologies. She successfully demonstrated a technique suitable for unconventional and conventional chaff.

Dr. Louis M. Cameron, assigned to the Far Infrared Team, Systems Development Technical Area, ECOM Night Vision Laboratory (NVL), Fort Belvoir, VA, was selected for technical leadership of the Common IR Module Program developed by the U.S. Army for interchangeability of components for precise requirements of the Army, Navy and Air Force. Joint large-scale procurement substantially reduces costs.

"Through superb technical judgment

and outstanding leadership talent," the citation states, "Dr. Cameron has succeeded in building a viable, thriving program, completing the current contractual program to support a second-source effort which will be a key factor in standardization and cost reduction."

In addition, "he is responsible for establishing an exemplary far infrared systems laboratory with extensive capabilities for the comprehensive test and rapid evaluation of contractor-deliverable modules; and for the timely construction and test of such component design modification or proposals as may occur in the course of special applications engineering efforts and advanced technology inputs under way or contemplated by the NVL."

U.S. Army Satellite Communications Agency (SATCOMA), Fort Monmouth, NJ. *William W. Davison*, chief of Phase II Terminals Division, SATCOMA, will be honored for his contribution to the improved Direct Communications Link ("Hot Line") between Washington, DC, and Moscow, USSR.

This portion of the improved communications link utilizes the Soviet Molniya Communication Satellite. It is termed "one of the parallel satellite communications links and will provide a modern, highly reliable means for communication between the highest levels of government in the United States and USSR."

Based on technical discussions with the Soviets, as a technical member of the U.S. delegation in the 1972 meeting, Davison supervised the contractual preparation for and the resulting development/installation of the earth terminal at Fort Detrick, MD.

U.S. Army Armament Command (ARM-COM), Rock Island, IL. A team from the Artillery and Armored Weapons Systems Directorate, Rodman Laboratory will receive R&D awards for work in developing a Compressible Fluid Recoil Mechanism for tank armament. The team is composed of mechanical engineers *Achiel M. Dupont and J. Burnett Moody*, and physicist *Roger L. Newlon.*

Differences in operation of the Compressible Fluid Recoil Mechanism and conventional mechanisms are in the methods and principles employed to perform the energy dissipation and energy storage functions. Availability of the new mechanisms for armored weapon system designs, the citation states, "will contribute to ARMCOM's goal of providing weapons with significantly improved reliability, maintainability and operational characteristics."

Dr. Shih-Chi Chu, a mechanical engineer with the Research Directorate, Rodman Laboratory, was cited for developing an effective incremental theory for solving the problem of partially yielded thick-walled cylinders made of strain-hardened materials subjected to



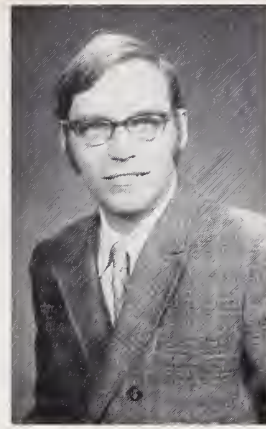
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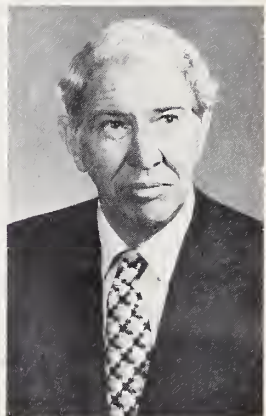


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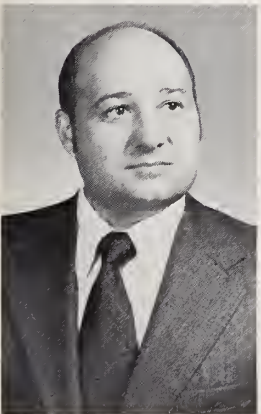
R&D Achievement Award Winners

U.S. Army Electronics Command (ECOM), Fort Monmouth, NJ—(1) Ronald Wright (2) John Ransom (3) Henry Saphow (4) Frederick A. Kobylarz (5) Michael R. Mirachi (6) Mrs. Joy L. Arthur. Night Vision Laboratory, Fort Belvoir, VA—(7) Dr. Louis M. Cameron. U.S. Army Satellite Communications Agency (SATCOMA), Fort Monmouth, NJ—(8) William W. Davison. U.S. Army Armament Command (ARMCOM), Rock Island, IL—(9) From left, Roger L. Newlon, Achiel M. Dupont, J. Burnett Moody (10) Dr. Shih-Chi Chu. Picatinny Arsenal, Dover, NJ—(11) Dr. Harry F. Freeman (12) Hugo Dezio (13) Samuel Davelman (14) Martin Connor (15) Hubert W. Meyer Jr. (16) Joseph O. Juliano.

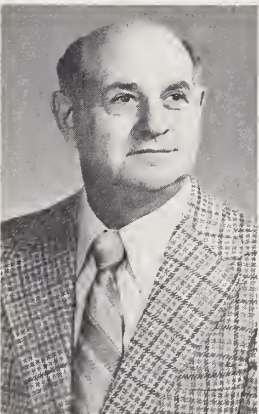
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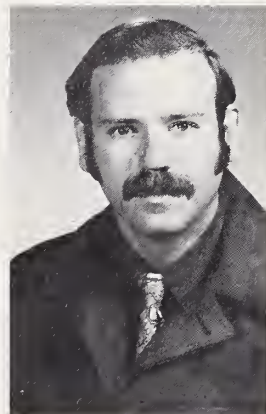
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Army R&D Achievement Awards . . .

(Continued from page 17)

pressures, axial loading, and thermal loading.

Application of Dr. Chu's theory is greatly facilitating design of gun barrels by permitting increases in firing rates and achieving maximum reductions in weight of the barrels.

Picatinny Arsenal, Dover, NJ, engineers *Dr. Harry F. Freeman*, *Hugo Dezio* and *Samuel Davelman*, all employed with the Ammunition Engineering Division, were selected for development of advanced techniques in the use of explosive materials.

Their work is acclaimed a technical breakthrough for the emergency destruction, explosive ordnance disposal, and demilitarization of a new family of improved conventional munitions. They "pioneered hazard classification testing of improved conventional munitions by employing unique methods of initiating the various types of munitions using minimum amounts of initiating explosives."

Joseph O. Juliano, *Martin Connor* and *Hubert W. Meyer Jr.*, Picatinny Arsenal research team, assigned to the Ammunition Development and Engineering Directorate, were chosen for "engineering excellence in the successful completion of the Product Improvement Development Phase of the 'Full Frontal Area Impact Switches' for the M456 105mm and M409 152mm Projectiles."

The electromechanical power supplies and switches, which can be retrofitted to upgrade existing stockpiles of antitank ammunition, add "a significant improvement in effectiveness without the large cost of producing new projectiles."

A new methodology for accurately defining critical flaw sizes in high-energy artillery projectiles was developed and verified by a team of five scientists and engineers. *George Demitrack* and *Thomas M. Roach Jr.* are from the Picatinny Feltman Research Laboratory. *John D. Corrie*, *Joseph H. Mulherin* and *William B. Steward* are from Frankford Arsenal's Pitman-Dunn Laboratory.

The team devised and implemented a linear fracture mechanics approach to the problem of describing the sizes and location of sharp flaws that would critically affect the material safety of HE projectiles manufactured from high-fragmentation steels of relatively low toughness.

Use of this methodology is to be incorporated into all high-fragmentation steel projectiles currently under development—and all future-generation artillery projectiles—to provide an assessment of material safety and a more reliable basis for establishment of inspection standards.

Frankford Arsenal, Philadelphia, PA. A 5-man team will receive R&D awards for development of a dual safe electro-mechanical safing and arming (S&A) device for the fin-stabilized XM712 Cannon Launched Guided Projectile (CLGP).

Robert A. Shaffer, *John P. Hunt* and *Eugene O. Zyblukewycz* are assigned to

the Munitions Engineering & Development Directorate, *Alan D. Aronoff* to Pitman-Dunn Laboratory, and *Alexander Pecura* to the Technical Support Directorate.

Their citation acknowledges "unprecedented technical achievement in solving the formidable problems of providing a second environment sensing system for a nonspinning projectile." They effectively interfaced this sensing system with a remotely located mechanical safety and arming assembly dictated by the CLGP system constraints.

"The results of laboratory, environmental and ballistic testing of S&A components and complete S&A devices conducted during this advanced development effort have clearly demonstrated that the design will provide warhead safety in full compliance with the unique and unconventional needs of the CLGP."

Watervliet Arsenal, Watervliet, NY. During the Development Phase of the 105mm XM204 Soft Recoil Artillery System, *Thomas D. Allen*, *Michael J. Glennon* and *John P. Kehn* combined talents in design, fabrication and testing a cannon which "met or exceeded all of the performance requirements for close-support artillery. . . . The simplicity and ruggedness designed into this cannon provide significant improvement in reliability, maintainability and durability over any cannon within the current artillery inventory."

Edgewood Arsenal, Aberdeen Proving Ground, MD. *Abraham Flatau*, chief of the Weapons Systems Concepts Office, was cited for contributions that "have led to significant advances in weapons technology and the revolutionizing of future combat and civil disturbance weapons. Through his conceptual and engineering studies, he evolved a concept which he weaponized to produce several aeroballistic projectile configurations covering a variety of applications."

Notable among these was the design and development of a nonlethal chemical system, in the form of an aeroballistic projectile (Ring Airfoil Grenade concept) with a flat trajectory, for use in controlling civil disturbances. The system "has received acceptance throughout the government."

U.S. Army Missile Command (MICOM), Redstone Arsenal, AL. *Orval E. Ayers* and *LT Roy E. Patrick*, of the Propulsion Directorate, U.S. Army Missile RD&E Laboratory, MICOM, were selected for their efforts in developing a solid propellant suitable for generating hydrogen or deuterium for use in the Army's high-energy laser programs.

The summary of achievement states: "This solid hydrogen gas generator will eliminate the hazards and logistic complications associated with the use of high-pressure or cryogenic liquid hydrogen in an operational HF/DF chemical laser. The solid propellant provides a storable hydrogen/deuterium gas source that combines instant readiness with

good handling behavior, compact storage, and safety."

Joseph R. McGinty, Advanced Sensors Directorate, will receive an R&D award for a "major breakthrough" in infrared guidance for air defense missiles.

"His initiative, inventiveness, and persistence," the citation states, "have made possible the successful development of an infrared seeker that is immune to flare countermeasures, thus enhancing the capability of the United States to successfully engage and destroy the projected aircraft threat."

Leon H. Riley, Test and Evaluation Directorate, RD&E Lab, was recognized for development of an infrared data link consisting of an IR transmitter, IR receiver and interconnecting fiber optics, "which greatly expands the Army's missile test capability." Guidance parameters are converted to IR and transmitted through the fiber optics to a receiver that converts the IR into records that can be analyzed.

Separate AMC Installations. *Anders S. Platou*, Exterior Ballistics Laboratory, U.S. Army Ballistic Research Laboratories (BRL), Aberdeen Proving Ground, MD, was cited for development of a new series of nonconical projectile boattails. Aerodynamically superior to conical boattails, they add a new dimension to information that can be made available to aid designers in selecting an effective configuration for future shell development. Utilization of this design could lead to projectiles with higher stability, longer ranges and higher payloads.

George E. Hauver, Terminal Ballistics Laboratory, BRL, was chosen by judges for his "concepts about the relation of shocks to military weapon performance, his development of a new technique for the evaluation of thermal states of shocked metals, and the data base he established for residual shock temperatures."

The nomination states that "results of his work have opened the way for new developments in shaped-charge weapons, and they have caused shaped-charge development programs to be restructured to reflect the new findings."

Harry Diamond Laboratories (HDL), Adelphi, MD. *Drs. Joseph Nemarich*, *Joseph P. Sattler* and *Bruce A. Weber* will receive a team award in recognition of their contributions to laser technology; for the development of the first spin-flip Raman laser using mercury cadmium telluride, and for the measurements of the magneto-optic properties of this material.

Their description of achievements states: "Immediate applications for this laser are as a local oscillator for infrared heterodyne receivers, as a high-brightness, high-resolution source for determining the laser transmission properties of the atmosphere, and for covert, short-range communication links."

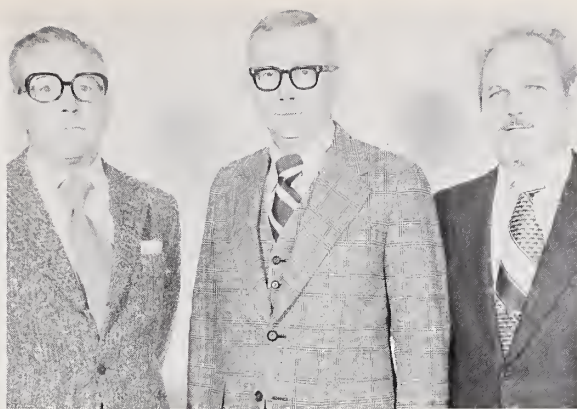
"A major research laboratory has also expressed interest in this laser for the separation of isotopes of materials with military application. Thus, this development of a new tunable laser will provide the basis for substantial improvements



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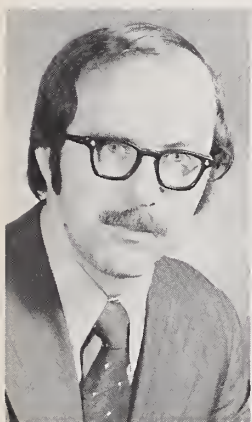
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R&D Achievement Award Winners

Picatinny Arsenal, Dover, NJ—(1) Thomas M. Roach Jr. (2) George Demitrack. Frankford Arsenal, Philadelphia, PA—(3) From left, Joseph H. Mulherin, John D. Corrie, William B. Steward (4) Robert A. Shaffer (5) John P. Hunt (6) Eugene O. Zyblikewycz (7) Alan D. Aronoff (8) Alexander Pecura. Watervliet (NY) Arsenal—(9) Thomas D. Allen (10) Michael J. Glennon (11) John P. Kehn. Edgewood Arsenal, Aberdeen Proving Ground, MD—(12) Abraham Flatau. U.S. Army Missile Command, Redstone Arsenal, AL—(13) Orval E. Ayers (14) LT Roy E. Patrick (15) J. R. McGinty (16) Leon H. Riley.

(Continued on page 20)



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Army R&D Achievement Awards . . .

(Continued from page 19)

in military laser systems."

A second HDL team effort was recognized by selection of *Dr. Howard S. Jones Jr.* and *Frank Reggia* to receive awards for their "pioneering efforts and outstanding accomplishments in the design, development and demonstrated use of a novel group of conformal antennas for military weapon systems."

These high-performance antenna designs have demonstrated they are capable of eliminating many mechanical and electrical problems, while enhancing overall system performance. The antennas are constructed as an integral part of a body, at any position along its length and flush with the surface.

Dr. Jones, a supervisory physical scientist, and *Reggia*, a research electronic engineer, are with the Advanced Research Laboratory, engaged in R&D on antenna system designs and microwave circuitry for fuze and weapon systems.

John R. Dent, *Dr. Forrest A. Agee Jr.*, *Dr. Huey A. Roberts* and *George D. Crowson* make up the third HDL team honored by R&D Achievement Awards.

Employed in the Electromagnetic Effects Laboratory, the group was cited for work "which has materially improved the Army's technical capability in EMP simulation, test and evaluation areas."

The citation further states that "this work has also established a scientific basis for subsequent technical improvements of military importance in EMP hardening of shielded structures includ-

ing buried communications, control and power systems."

CORPS OF ENGINEERS

Waterways Experiment Station (WES), Vicksburg, MI. *Hugh L. Green*, Soils and Pavements Laboratory, was cited as an individual award winner for his "contributions toward the successful development of two lightweight airplane landing mat systems for use as expedient surfacing on military airfields."

This achievement is the culmination of a program that involved continuous contributions over a 7-year period to the knowledge and understanding of the landing mat program. Results have provided lightweight, expedient surfacing materials at reduced costs. Emplacable in only a few days, the mats will support military operations of C-130 cargo, F-4C fighter, and F-111 fighter-bomber aircraft.

Construction Engineer Research Laboratory (CERL), Champaign, IL. *Paul A. Howdyshell*, a civil engineer, was selected for his work in developing equipment and procedures for assessing the quality of fresh concrete in large-scale construction projects.

"Unlike time-consuming testing of hardened concrete samples," the award justification states, "this new technique can determine water and cement content in 15 minutes." The results are termed "of great potential benefit to the Department of Defense and the industrial community as well."

SURGEON GENERAL

U.S. Army Medical Research Institute of Infectious Diseases, Fort Detrick, MD. AMRIID's winners are *Dr. Peter G. Canonico* and *Dr. Francis E. Cole Jr.*

Dr. Canonico is cited for development and application of advanced biology concepts for evaluating mechanisms of cellular function associated with host resistance to infection . . . for "contributions (that have) served to delineate specific targets for clinical intervention and identification of indices for assessing therapeutic efficacy. . . . His thorough knowledge of vaccine production and testing procedures and their safety standards aided immeasurably to the time when the vaccine could be used in man."

Dr. Cole was recognized specifically for outstanding contributions in developing a safe and effective vaccine for immunizing against Venezuelan Equine Encephalomyelitis.

U.S. Army Aeromedical Research Laboratory (AAMRL), Fort Rucker, AL. *Joseph L. Haley Jr.* was commended for establishing a new standard of lifesaving crashworthiness engineering through his invention, development and validation of the crashworthy helicopter troop seat.

"A recognized international authority in the field of aviation crashworthiness and crash injury research," the citation states, "his extraordinary accomplishments and dynamic leadership in the development of safer aircraft have demonstrated that the integrated application of engineering and aviation medicine can effectively conserve the fighting strength with cost-effective success."



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U.S. Army Ballistic Research Laboratories—(1) Anders S. Platou (2) George E. Hauver. Harry Diamond Laboratories—(3) Dr. Joseph P. Sattler (4) Dr. Bruce A. Weber (5) Dr. Howard S. Jones Jr. (6) Frank Reggia (7) John R. Dent (8) Dr. Forrest A. Agee Jr. (9) Dr. Huey A. Roberts (10) George D. Crowson. U.S. Army Corps of Engineers, Waterways Experiment Station—(11) Hugh L. Green. Construction Engineer Research Laboratory—(12) Paul A. Howdyshell. Office of the Surgeon General, U.S. Army Medical Research Institute of Infectious Diseases—(13) Dr. Peter G. Canonico (14) Dr. Francis E. Cole Jr. U.S. Army Aeromedical Research Lab—(15) J. L. Haley Jr.

Speaking On...

(Continued from inside front cover)

American opposition, did North Vietnamese military power finally achieve its objectives.

Though our Armed Forces did all that was asked of them, it will be stated that the effort itself was pointless. In some sense, such may be said of any national effort that ultimately fails. Yet our involvement was not purposeless. It was intended to assist a small nation to preserve its independence in the face of external attack and to provide it with at least a reasonable chance to survive.

We did as much and more. That the Republic of Vietnam eventually succumbed to powerful external forces vitiates neither the explicit purpose behind our involvement—nor the impulse of generosity toward those under attack that has long infused American policy. Whether or not we failed, let it never be said that we failed to try.

Now it becomes your duty and your turn. How severely you will be tested must remain uncertain in this less than best of all possible worlds. But whatever happens, you will find the military profession more demanding of traditional

sentiments and virtues than has been the fashion of late in society as a whole. Many years ago, Clausewitz explained why.

"War is a special profession," he wrote. "To be imbued with the spirit and essence of this profession, to train, to rouse, to assimilate into our system the powers which should be active in it, to apply our intelligence to every detail of it, to gain confidence and expertness in it through exercise, to go into it heart and soul, to pass from the man into the role which is assigned to us in it—that is the military virtue of any army in the individual."

Dedication of this order admittedly becomes more difficult, yet is even more required when a war grows unpopular. And we should not delude ourselves in this regard: As a nation that must remain the strongest champion of national independence and territorial integrity, we cannot dismiss the possibility that there may be other difficult and even unpopular wars.

Even before the advent of nuclear

weapons and instant communications, Clausewitz stated a proposition that may influence your lives, especially since it was subsequently embraced by Lenin and his associates. "War," he said, "is a mere continuation of policy by other means." And he added: "How can we conceive it to be otherwise? Does the cessation of diplomatic notes stop the political relations between different nations and governments? Is not war merely another kind of writing and language for their thoughts? It has, to be sure, its own grammar, but not its own logic."

The challenges to you under such conditions will be great and continuing. As national moods and inclinations shift in course, you will need all the spirit, the discipline, and the sense of high purpose that your years here have given you. Those of you who have chosen the profession of arms, have not chosen an easy one; you may suffer periods of neglect and frustration. But none of you can forget: You are desperately needed.

Engineer Topographic Labs Study Environmental Tests

By Thomas E. Niedringhaus
Geographic Applications Division, ETL

The intent of a research project initiated recently by the U.S. Army Engineer Topographic Laboratories (USAETL) is to provide better information to development and test engineers concerning the effectiveness of materiel testing at the Army's "extreme environment facilities."

The Army devotes a sizable chunk of its manpower resources and expends considerable money to test materiel at these extreme environment centers—the Arctic Test Center at Fort Greely, Alaska; the Tropic Test Center in the Canal Zone; and the Desert Test Center at Yuma Proving Ground, Arizona.

The purpose of the testing programs is to determine the combat readiness and survivability of Army materiel under conditions of extreme environmental severity. A natural question arises as to how representative these centers are of the world's most extreme environments.

Studies initiated by USAETL shed some light on this question by focusing on the extent to which each test center provides a truly representative extreme environment. The study format includes a graphic which depicts those areas of the world that have climatic conditions more severe than those normally found at the established test sites.

To date, studies have been published indicating (1) world areas with higher mean-monthly-maximum temperatures than Yuma Proving Ground during its

summer test season, (2) areas with lower mean-monthly-minimum temperatures than the Arctic Test Center during its winter test season, (3) areas with higher mean-monthly-dewpoints than the Tropic Test Center, (4) areas with higher rainfall intensities and frequencies than the Tropic Test Center.

The first two studies are examples of the worldwide comparisons presented. The Yuma study shows that for the hottest month (July), the only extensive area that has higher mean maximum temperatures for its hottest month is the Sahara Desert core in North Africa.

Comparison of the mean-maximum temperature for the beginning of the testing season at Yuma (May) with temperatures during the hottest month of the year in the rest of the world,

reveals very extensive areas in North Africa, Southwest Asia, the Indian Subcontinent, and Australia that have higher temperatures.

The Arctic Test Center study showed that relatively limited areas have lower mean minimum temperatures during their coldest months than the center during January, its coldest month. Very extensive areas in North America, Asia and Greenland have lower temperatures than the Alaska test site during March, its warmest winter test month.

These examples and the other continuing studies provide materiel developers with new tools for assessing risk of failure of a tested item which may have performed marginally in what has been considered as a representative extreme environment.

Army Austerity Program Closes Boston Liaison, Far East Units

Closing of the Boston Area Research and Development Liaison Office, and the U.S. Army R&D Group Office for the Far East, located in Tokyo, Japan, has been announced by COL Lothrop Mittenhal, commander of the Army Research Office in Durham, NC, an element of the Army Materiel Command.

The forerunner of the Boston ARDLO dated to World War II when the U.S. Army Signal Corps established a liaison function to coordinate extensive program actions involving both industrial organizations and the concentration of private research and academic scientific institutions.

Alvin D. Bedrosian, who had announced his retirement in December 1974, continued as head of the Boston ARDLO to complete termination actions with the extensive industrial and academic community served by the liaison office. It was officially closed May 15 and his retirement ended a 34-year Army civilian career.

COL John Marshall, who headed the U.S. Army R&D Group, Far East, is now assigned to Letterman Army Institute of Research in the Presidio, Monterey, CA. Functions of the group, including contracts, have been transferred to the Army Research Office in Durham.

Foreign Developments in Hydrogen Technology

By James D. Busi

U.S. Army Foreign Science
and Technology Center

International concern about inflated costs of electric power generated with fuel oil or coal is turning attention to research and development directed to alternative, more efficient and economical production processes.

Scientists in the United States, attempting to exploit the potential of various methods of power generation, are watching with interest foreign progress in developing hydrogen technology as a promising approach.

Researchers in numerous countries are viewing hydrogen as an ecologically advantageous fuel in that it is oxidized by either thermal or electrochemical processes. It is renewable and is not exhaustible as are other hydrocarbon fuels. Hydrogen can be regenerated by electrolysis, radiolysis or thermochemical decomposition of water, with oxygen (O₂) as a byproduct.

Another advantage of hydrogen is that it can be used as an "energy carrier" for efficient transmission of electricity (300+ miles). When used in this manner, transmission is dependent upon a fuel cell unit to convert chemical energy of hydrogen into electricity.

Several basic methods for generation of chemically pure hydrogen are commercially available or under developmental consideration for generating large quantities to serve industrial requirements. The methods include, as mentioned earlier, electrolysis or radiolysis of water, thermochemical decomposition of water, and steam reformation of hydrocarbon and carbonaceous fuels.

Electrolysis of water is *not new* and is a technology used commercially in areas where abundant resources of electricity are available. This process, however, is economically dependent upon the cost (mills/KWH) of electricity.

Photo-electrolysis using visible light as an energy source has been proposed

by Dr. Akira Fujishima of Kanagawa University of Yokohama, and Dr. Kenichi Honda of the University of Tokyo. This system uses visible light, at wavelengths shorter than 4.15×10^{-7} meters, which is absorbed by a semiconductor.

The semiconductor releases energy by excitation of the material's lattice, generating an anodic current. The wavelength of the absorbed light corresponds to the point of maximum energy utilization of the titanium dioxide (TiO₂) semiconductor (band gap energy 3.0ev).

This anodic current is caused by the redistribution of electrons in the valence levels of TiO₂ resulting in the formation of "holes." Because of the nature of the n-type TiO₂ semiconductor as an "electron donor," a potential is generated for electrochemical decomposition of water according to the following reaction:

1. Semiconduction electrode (+):
 $\text{TiO}_2 + \text{light} \longrightarrow e + p^+$
 $\text{oxygen evolution } 2p^+ + \text{H}_2\text{O} \longrightarrow \frac{1}{2}\text{O}_2 + 2\text{H}^+$
2. Platinum electrode (-):
 $2e + \text{H}^+ \longrightarrow \text{H}_2$
3. Over-all reaction:
 $\text{H}_2\text{O} + \text{light} \longrightarrow \text{H}_2 + \frac{1}{2}\text{O}_2$

The rate determining reaction in this process is dependent upon the wavelength of the absorbed light. Additional n-type semiconductors, such as zinc oxide (ZnO) and cadmium sulfide (CdS), may be used for electrodes. Furthermore, it is postulated that by using irradiated p-type semiconductor electrodes, such as gallium (Ga), efficiencies may increase.

The future feasibility of this Japanese process for commercial hydrogen production will be dependent upon the cost of the semiconductor materials and fabrication processes. Maximum efficiencies ranging from 12 to 16 percent are anticipated, with an initial cost in excess of \$5.00/10⁶ Btu using the higher heating value of hydrogen.

Over the past 5 to 10 years, numerous thermochemical decomposition processes of water have been postulated and analyzed for the generation of hydrogen

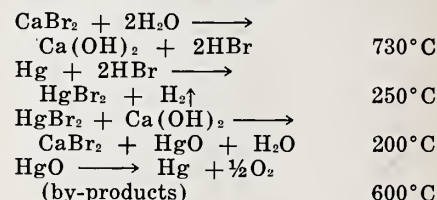
and other gaseous byproducts. Currently, over 30 processes have been suggested by U.S. and West European scientists. These systems require a heat source ranging from 600° to 1200°C.

Although in the initial stages of development, these various processes are attractive because they are closed cycles using water as the consumable resource. The other reactants are recycled in all of the proposed cycles.

Several thermochemical cycles suffer from severe corrosion problems, and others from temperatures in excess of the realistic capacity of future high-temperature, gas-cooled reactors (HTGRs). Systems requiring maximum activation temperatures of 600°C to 800°C are the most practical because they are within the limits of HTGR technology.

One of the most noteworthy thermochemical cycles was developed through the European Atomic Energy Research Organization (EURATOM) program, involving the Federal Republic of Germany, France, United Kingdom and Italy. European research also is being conducted in the Soviet Academy of Sciences, with activities in Moscow, Leningrad and Sverdlovsk.

In 1970, Dr. G. DeBeni and Dr. C. Marchetti of Italy proposed the Mark I, or Calcium Bromide Cycle:

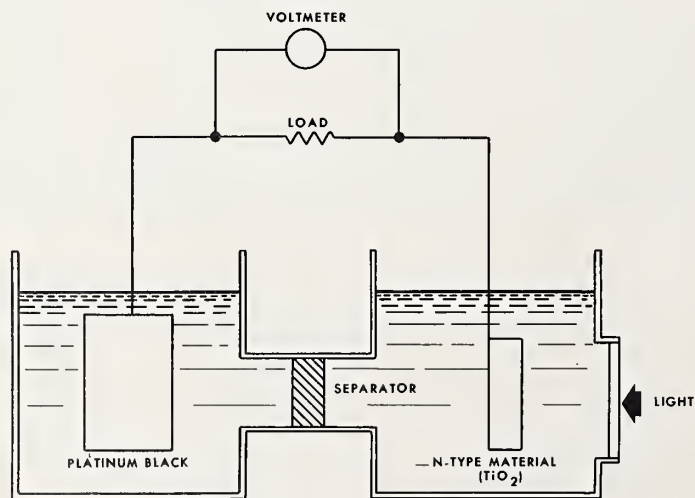


This process has calculated thermal efficiencies of 59 and 49 percent, respectively, using the higher and lower heating value for hydrogen. The hydrogen may be generated at a delivery pressure of 15 atmospheres but suffers from severe corrosion due to halides. Furthermore, this system will be expensive due to the cost for mercury (Hg). A copper substitute for Hg has been suggested at the expense of a higher decomposition temperature for the oxide (CuO).

Researchers at the Japan Atomic Research Center are developing a process for generating large quantities of hydrogen (H₂) through the radiolysis of water, using a nuclear reactor as a source of large amounts of heat and radiation. Conventional nuclear reactors are designed to produce electric power or motive power by changing the kinetic energy of fission into thermal energy.

The Japanese are utilizing the nuclear reactor, termed a chemonuclear reactor in this process, due to the large quantities of immediately available radiation energy. A sodium-cooled reactor could use the primary heat exchanger as an excellent source of gamma radiation for the large-scale production of raw materials, and in particular hydrogen.

Selection of the appropriate chemical reaction for the chemonuclear reactor is of great importance. Appropriate reactions must be endothermic with the G

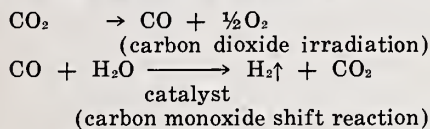


Fujishima-Honda Photo-Electrolysis Cell

value (number of molecules converted per 100 eV of energy absorbed between 1 and 10).

The reaction system also has to be relatively simple to minimize formation of byproducts. This limits the amount of energy and materials required for separation and purification processes. In the use of fission fragments for irradiation, a reaction system with a LET (linear energy transfer) effect and temperature effect is desirable.

The radiolysis of carbon dioxide for hydrogen production according to the following reaction is promising:



This may be a closed-cycle process with water as the consumable resource and oxygen as a chemically pure byproduct. It may be readily adapted to a uranium-fueled, graphite-moderated, CO₂-cooled indirect cycle-type reactor in conjunction with a heat exchanger and turbine power generator.

Potential U.S. Army applications would include floating nuclear barges for power and fuel for both aircraft and land vehicles. The tactical advantage is the elimination of logistical fuel support, making the local area totally independent concerning its energy requirements. In a national emergency, such a system would be an adequate substitute for a local power/fuel shortage.

Army Selects 22 ISEF Winners

(Continued from page 13)

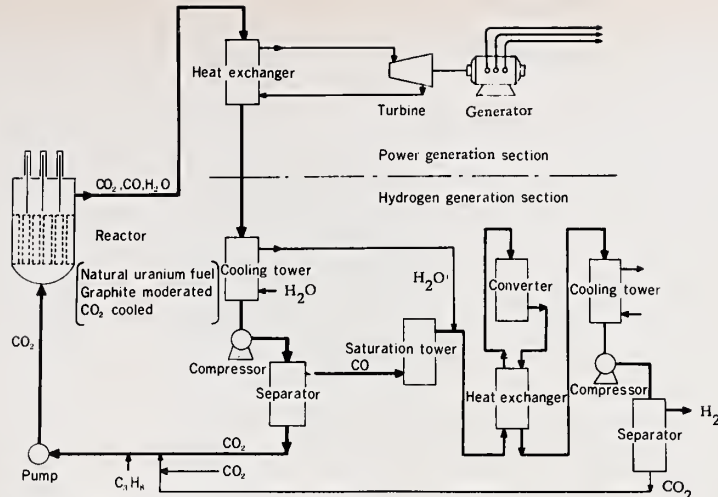
ing Thin-Layer Chromatography as One Parameter"; and (Navy) *Reuben Jusino*, 16, Lola R. de Tio H.S., San German, Puerto Rico, for "Comparative Analysis of the Sandy Beaches of Puerto Rico."

Miss Craig also received an Honorable Mention Certificate (HMC) from the American Chemical Society, a Research Service Certificate and offer of a summer position by the U.S. Department of Agriculture (USDA), and HMC from the American Dental Association.

Nobel Prize Ceremonies. Army award winner *Jon M. Huppenthal*, 17, Marquette H.S., Michigan City, IN, displayed at the ISEF "Human Cancer Detection Through Application of NMR Spin-Spin Relaxation Time." Huppenthal received a second-place award of a certificate and a \$25 Savings Bond from the Patent and Trademark Office/U.S. Department of Commerce, a U.S. Navy certificate and Navy Science Cruiser Award, and an American Medical Association Award.

The U.S. Navy selected *Reginald Kevin Jenkins*, 18, Gonzaga College H.S., Washington, DC, for "Effects of Chalones on Transformed Lymphocytes." The U.S. Air Force chose *David M. Eslinger*, 18, C. D. Donart H.S., Stillwater, OK, for "Glucose-Oxygen Fuel Cells."

Alternates for the Nobel Visit Award are: (Army) *Richard M. Busch*, 17, Warwick H.S., Lititz, PA, for "Central Pennsylvania Shriver, Dalmanitacea (Trilobita): Their Uniqueness and Paleoenvironmental Habitat"; (Navy) *Deborah Ann Steckhouse*, 18, Upper Perkiomen



Japanese System Diagram for Proposed Radiolysis of CO₂, H₂ Production Plant

JAMES D. BUSI is a chemist presently engaged in analysis of foreign research in the area of electrochemical energy conversion systems and hydrogen technology with the U.S. Army Foreign Science and Technology Center, Charlottesville, VA. He is a 1970 graduate of Christian Brothers College, Memphis, TN, and a member of the American Chemical Society, the Electrochemical Society, and Interagency Advanced Power Group.



James D. Busi

H.S., Pennsburg, PA, for "Myo-Electric Prosthetic Terminal Device"; and (Air Force) *Margaret Raymond*, 18, Notre Dame de Sion H.S., Kansas City, MO, for "An Investigation Into the Utilization of Corncobs in Paper Production."

Army alternate *Richard Busch* also received an American Association of Petroleum Geologist (AAPG) second-place award consisting of an offer for summer employment with the U.S. Geological Survey (USGS).

Other Army Superior Award winners are *Sarah Elizabeth Dennis*, 14, John Marshall H.S., San Antonio, TX, who exhibited "Natural Dyes"; *Richard James Foch*, 18, Astronaut H.S., Titusville, FL, for "Safer Wings for Tomorrow"; *Robert R. Siffring*, 16, David City (NB) H.S., for "Six Eyes on the Universe"; and

Tisha Ann Fendley, 17, The High School for the Health Professions, Houston, TX, for "Mutants of *Serratia marcescens*"; *Joel H. Moser*, 16, John Dewey H.S., Brooklyn, NY, for "Quantitative Study of Immunity in *Crassostrea virginica*"; and *Richard H. Ebright*, 15, Muhlenberg Twp. H.S., South Temple, PA, for "Effects of Cauterization of the P.P.M. of *Danaus plexippus plexippus*."

Miss Dennis also received a first-place award of a certificate and a \$100 Savings Bond from the Patent and Trademark Office/U.S. Department of Commerce. *Richard Foch* received the General Motors Corp. award, the NASA Award of a Certificate of Merit and an expense-paid trip to the John F. Kennedy Space Center, a U.S. Department of Transportation award of a summer job offer, and a U.S. Navy Certificate and Navy Science Cruiser Award.

Robert Siffring won honorable mention by the American Patent Law Association, in the field of mechanical engineering. Miss Fendley received an American Chemical Society honorable mention award, the American Society for Microbiology second-place award of a plaque

and \$75 Savings Bond, and the U.S. Air Force Award in microbiology.

Joel Moser won the ASM Honorable Mention plaque and \$25, and a U.S. Navy Certificate and Navy Science Cruiser Award. *Richard Ebright* also was presented the Eastman Kodak Co. award of \$100, the Entomological Society of America (ESA) second-place award of a \$50 Savings Bond, and a U.S. Navy Certificate and Navy Science Cruiser Award.

Army Meritorious Award winners are *David Earl Christian*, 15, Dixie H.S., St. George, UT, for "Performance Characteristics of Gerbils"; *Patrick Adlercreutz*, 18, Stroembergskolan Lund, Sweden, for "Peroxidase"; *Dean P. Chang*, 14, Albert Einstein H.S., Sacramento, CA, for "Algae: Food Source for the Future"; and

Terrance L. Swift, 17, West Springfield (VA) H.S., for "Kinetics: The Effect of Metal Ions on Catalysis"; *Ri McGlamery*, 18, Chipley (FL) H.S., for "The Liesegang Phenomenon: Production, Lophoresis and the Hirsch Effect"; *Charles Edward McKemie*, 17, Griffin (GA) H.S., for "Ontogeny of the Chester Blastoid *Pentremites cherookeus* Hall"; and

Mary Theresia Kroening, 16, Patrick Henry H.S., Minneapolis MN, for "Analysis of Mobius Strips and Other Related Bands"; *Danny H. Craft*, 18, Henry W. Grady H.S., Atlanta, GA, for "Parsing Apple"; *Lise Desquenne*, 17, Burrillville H.S., Harrisville, RI, for "Discovering New Methods of Typing Blood Using Seed Extracts"; and

Kristina M. Johnson, 17, Thomas Jefferson H.S., Denver, CO, for "Holographic Study of the Sporangiophore of Phycomycetes"; and *Brian L. Aycock*, 17, Melbourne, FL, H.S., for "Pheromones: Chemosensory Secretions as Communication in Trail-Laying Ants."

Administrative arrangements for the ISEF were coordinated by Science Service Director *Edward G. Sherburne Jr.*, *Dorothy Schriver*, assistant director, and *Carrie Levandoski*, administrative aide.

Women in Army Science...

EEO Achievements . . .

Earn Dual Awards for ECOM Education Assistant

Dr. Priscilla Ransohoff, assistant in Education at the U.S. Army Electronics Command (ECOM), has been twice cited for promoting Equal Employment Opportunity goals of the Department of the Army and the U.S. Army Materiel Command.

Secretary of the Army Howard H. Callaway credited her for achievements in combating sex discrimination in federal employment practices when he presented Dr. Ransohoff with the DA Equal Employment Opportunity Award at a recent ceremony in the Pentagon. Earlier, she became the first recipient of AMC's EEO Action Award.

Employed at ECOM since 1964, she was appointed assistant deputy Equal Employment officer in 1967, and in 1968 was named Federal Women's Program (FWP) Coordinator for Fort Monmouth, NJ. In 1973, she conducted an FWP workshop at the Army's worldwide EEO Conference in Washington, DC.

Dr. Ransohoff is a founding member of the organization of Federally Employed Women (FEW) and has served twice as its national president. She has organized two Toastmistress Clubs and is currently conducting a series of public speaking seminars for executives and supervisors at the Pennsylvania State Department of Education.

Graduated with a BA degree from the University of Pittsburgh, she holds master's and PhD degrees in education from Columbia University. She teaches sociology and psychology at Brookdale Community College and is a consultant for Catholic University's Department of Educational Technology.

ECOM's 'First Lady' GS-15

Marilyn Levy Climaxes Research Career



Promotion to Federal Civil Service Grade GS-15 recently made Marilyn Levy the first woman in the U.S. Army Electronics Command to achieve that status. As head of the Photo Optics Technical Area, Combat Surveillance and Target Acquisition Laboratory, she had won many honors during a 22-year career.

Internationally known for her photographic research, which has been rewarded by 18 patents, Miss

Levy was a 1973 recipient of the prestigious Army Research and Development Achievement Award. Twice nominated for the Federal Women's Award, in 1970 and 1972, she was a 1971 recipient of the Army's Decoration for Meritorious Civilian Service.

Miss Levy's work on light sensitive materials, photographic chemistry, and color processing is credited with altering many traditional concepts of photographic science. Several manufacturers of photographic equipment have marketed products based on her work, and the concepts have been applied to government and industrial photographic processes.

Miss Levy is a graduate of Hunter College, New York City, and did graduate study in chemistry at Polytechnic Institute of Brooklyn. She worked for several industrial chemical firms in the New York metropolitan area until 1953.

A member of the Society of Photographic Scientists and Engineers, she serves on the editorial review board of its journal and is chairman of the Processing Section. She has been vice president, secretary and counselor of the Monmouth chapter, chairman of the society's Lectureship Committee and Journal Awards Committee, and is the official Army member on Film Sensitometry of the American Standards Institute.

Woman Works on Firing Line . . .

Yuma PG Employee Records Data on Projectiles

Duty on "the firing line" is a daily routine for Judy Rose, assigned to the Geodetics Section, Materiel Test Directorate, Yuma Proving Ground, AZ, to record impact data on missile tests.

Believed the only woman working as a field surveyor in Army missile firings, Ms. Rose works with teams supporting test projects on various types of ordnance. Her work involves many kinds of surveying and electronic time measuring instruments, and the setting up and operation of cinethodolites, a sophisticated high-speed tracking camera.

Born and reared in Madison, IN, she started her Federal Civil Service career at nearby Jefferson Proving Ground as a mathematical technician. In 1972 she transferred to Yuma Proving Ground for another assignment as a math technician in the data reduction section. Her supervisor sent her to take photo optical training, followed by training in geodetics.

An intended month of training was extended to five months in geodetics. By that time Judy liked the work so well she applied for a permanent job and was hired.

Queried about her attitude toward working at the receiving end of ordnance testing, a potentially dangerous job, she responded that everyone she works with is "really safety conscious!" Missiles may impact only a few hundreds of yards away, but she does not worry about hazards.



People in Perspective: Rollins Takes ARO Post

Those who have watched Donald C. Rollins in action since he became director of the National Junior Science and Humanities Program in 1969, as an employee of Duke University in Durham, NC, have long predicted that he was destined to exercise his talents in broader fields.

Effective in July, he fulfilled their expectations by taking over a new job that will continue his relationship with the National JSHS Program and expand his responsibilities to all scientific meetings under the aegis of the U.S. Army Research Office, Research Triangle Park, NC. His new title as an ARO employee is chief, Conferences and Symposia Office.

Don thus will play a major role in arrangements for the 1976 biennial U.S. Army Science Conference at the United States Military Academy, June 22-25, as well as Army participation in the International Science and Engineering Fair (ISEF) and various other meetings.

"Dynamic Don," as some associates have termed him, a bit facetiously, is really not far-fetched. "I like to make things happen," he responded when queried about his role in expansion of the NJSHS Program from 24 to 40 regions (48 states and U.S. Army Dependent Schools in Europe).

The program is dependent upon joint funding support from the Army, industry and academic institutions. "The assistance I get from everyone including those in Army labs, is just great," he says.

Enthusiasm is usually a basic ingredient for success of any executive, and Don considers his work in bringing together some 7,000 of the nation's brightest high school science students in regional symposia each year a "most rewarding opportunity to give them, with the help of a great many others, a helping hand toward career objectives."

"Don really puts his heart wholly in his work," an admirer said. That attitude may be somewhat attributable to his former position for three years, that of public relations director for the North Carolina Heart Association. He is a graduate from Randolph Macon College (BS in history) and has done graduate work at American University.



Reader's Guide . . .

Food Sciences Lab Lists 98 Research Tasks

Technical abstracts of 98 research tasks performed during Calendar Year 1974 at the Food Sciences Laboratory (FSL), established July 1, 1974, as a result of a major reorganization at the U.S. Army Natick (MA) Laboratories, now the Natick Development Center, are presented in a 92-page annual report.

Tasks of the FSL include those of the old Food Laboratory which was combined with elements of the Pioneering Research Laboratory (PRL). Three other labs were created at the same time—the Food Engineering Laboratory (FEL), Clothing, Equipment and Materials Engineering Laboratory, and the Aero-Mechanical Engineering Laboratory.

The stated mission of FSL is to plan, organize and direct basic and applied food sciences research and development. This includes providing background data and principles required to develop new and improved feeding systems under the Department of Defense Food Service Systems Program.

FSL also plans, organizes and directs basic and applied research and engineering to devise methods and systems for abatement and environmental pollution resulting from military activities; conducts research on prevention of microbiological deterioration of material; and provides technical support to the Standardization Program.

The report summarized 70 tasks and investigations in Research in Food Sciences, listed in the areas of microbiology, nutrition, analytical chemistry, food chemistry, human factors, field studies and food habits, taste, olfaction, appetite, and food acceptance.

"Radiation Sterilization of Prototype Military Foods: Low-Temperature Irradiation of 'Wholesomeness' Beef," is listed as one of the more significant efforts. Investigators were A. A. Anellis, E. G. Shattuck, Dr. D. B. Rowley, E. W. Ross Jr. (staff mathematician), D. N. Whaley and V. R. Dowell Jr.

Other reports include "Enterotoxin A Secretion Characteristics in a Fermentor," Dr. D. F. Carpenter and Dr. G. J. Silverman; "Chemical Changes Associated With Flavor in Irradiated Meat," Dr. C. Merritt Jr., Dr. P. Angelini, E. Wierbicki (FEL), and G. L. Schults (FEL);

"Development of Objective Methodology for Texture Measurements of Foods," R. A. Segars, SP5 R. G. Hamel, and Dr. John G. Kapsalis; "Taste Intensity and Pleasantness of Glucose," Dr. Howard R. Moskowitz and C. Dubose;

"The Effect of Serving Temperature on Food Acceptability," D. Waterman and Judith A. Westerling; "Consumption of Bitter Food During Long-Term Restricted Meal Scheduling," C. Greenwell and CPT (Dr.) R. C. Graeber; and "Field Feeding: Human Factors and Worker Opinion Aspects," CPT (Dr.) L. E. Symington, T. Eggemeier, Dr. T. L. Nichols and Dr. H. L. Meiselman.

Tasks in Pollution Abatement Research involved biotechnology, engineering technology, solid-waste management, and physiochemical technology.

Among 20 listed abstracts are "Enzymatic Saccharification of Cellulose," Dr. Mary H. Mandels, Dr. David Sternberg, R. E. Andreotti, J. E. Medeiros, T. Toman, C. D. Roche and PFC D. L. Boyer, an effort that has prompted the first international conference in this field at Natick this September.

"Biodegradation of Water Pollutants From Nitroglycerine Manufacturing Operations," Dr. T. M. Wendt, M. Elizabeth Pillion and Dr. A. M. Kaplan; "Pilot Study: Conversion of Cellulosic Material to Glucose," Dr. J. M. Nystrom, Dr. R. K. Andren, A. L. Allen and 1LT K. A. Kornuta;

"Tri-Service Solid Waste R&D Plan," T. H. Tassinari; "Characterization of Nitrocellulose Degradation Products," Dr. A. L. Bluhm, C. Di-pietro and Dr. J. Weinstein; and "Polymeric Materials," M. Greenberger, Dr. A. M. Kaplan and Dr. T. M. Wendt.

Eight abstracts in Appendix A summarize research in services. Among these are "Microbiological Analysis of Two Military Food Preparation and Dining Facilities," Dr. G. Silverman, E. M. Powers and Dr. D. B. Rowley; and "Nutrition Analysis Service," Miriam H. Thomas.

Compiled by the Military Requirements and Development Programs Office, the report also lists the seminars, visiting scientists, consultants and advisory committees, publications, reports, presentations, patents, and organizational structure and staff members of FSL.

Readers requiring additional information may address inquiries to the investigators named with the abstracts or to Dr. S. David Bailey, director of the Food Sciences Laboratory, U.S. Army Natick Development Center, Natick, MA 01760.

Handbook Describes Soviet Alloy Compositions

Information relative to the composition of a wide variety of metals and alloys of the Soviet Union is contained in a publication issued recently by the Metals and Ceramics Information Center, Battelle Columbus Laboratories, OH.

Handbook of Soviet Alloy Compositions is the result of a study conducted by Battelle for the Foreign Technology Division of the U.S. Air Force Systems Command, Wright-Patterson AFB, OH. Data on compositions, designations and other miscellaneous information are compiled in 25 cross-indexed tables.

A general discussion of the Soviet system for designation of metals and alloys is also presented and the specific designations used are given in the introduction preceding each table.

Copies are available in CONUS for \$25 and outside CONUS for \$27.50. Requests may be submitted to Metals and Ceramics Information Center, Battelle-Columbus Laboratories, 505 King Avenue, Columbus, OH 43201.

WES Report Examines Hydraulic Models Feasibility

Feasibility of using physical hydraulic models for estimating the effects of a proposed Lake Erie International Jetport on lake hydrodynamics is reported in a new publication issued by the U.S. Army Waterways Experiment Station, Vicksburg, MS.

Technical Report H-74-6, *Lake Erie International Jetport Model Feasibility Investigation*, examines mass circulation, wave action, breakwater stability, and longshore littoral transport models.

Printed copies of this report (\$3.00 printed; \$.95 microfiche) may be obtained from U.S. Department of Commerce, National Technical Information Service, Springfield, VA 22151.

Environmental Protection Agency Lists Grants

A 2-volume listing of grants issued by the U.S. Environmental Protection Agency (EPA) during the first half of FY 1975 is now available for purchase from the National Technical Information Services.

Volume I, titled "Environmental Protection Agency, EPA-GAD/1-75-001," deals with all awards in research, demonstration, training and fellowship. Requests should be directed to NTIS, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22151. The publication number is PB 241 476/AS, \$4.25 paper, \$2.25 microfiche.

Volume II lists all state and local awards and is titled "Environmental Protection Agency, EPA-GAD/1 75-002." Available at \$7.00 paper and \$2.25 microfiche, its publication number is PB 241 400/AS. Each entry includes grantee identification, program area grant title, grant number, award date and dollar amount.

Design to Cost Defense Directive 5000.28 Issued

Policy and guidance on the application of Design to Cost principles to the acquisition of defense systems, subsystems and components, is the purpose of newly issued Department of Defense Directive 5000.28. Provisions apply to the Office, Secretary of Defense, Organization of the Joint Chiefs of Staff, and military departments and agencies.

Design to cost objectives are: to assure that cost factors are equally important with technical requirements and schedules during weapons development, and to establish cost elements as management goals in balancing life cycle costs, acceptable performance, and scheduling.

Personnel Actions...

ODCSRDA Lists Supergrade Confirmations

Long pending confirmation of supergrade staff appointments within the Office of the Deputy Chief of Staff for Research, Development, and Acquisition, and transfer of some ODCSRDA scientists to other agencies are recent actions.

Dr. John G. Honig was confirmed as assistant to Director of Systems Review and Analysis Richard J. Trainor. David C. Hardison, adviser for Research, Development, and Acquisition to DCSRDA LTG Howard H. Cooksey, was awaiting confirmation of a new assignment at press time. Announcement cannot be made until the PL-313 transfer receives Civil Service Commission approval.

Dr. Vitalij Garber resigned as scientific adviser to the Director of Weapons Systems to accept a position with the United States Energy Research and Development Administration. Dr. William C. McCorkle is serving as his successor on a loan basis from HQ U.S. Army Missile Command, Redstone Arsenal, AL.

Dr. Richard L. Haley, scientific adviser to the Director of Combat Support Systems, resigned to accept a PL-313 transfer assignment as deputy to Army Materiel Command Director of Research, Development and Engineering BG Harry A. Griffith. He fills a PL-313 position vacant since retirement of Dr. J. V. R. Kaufman, who had served since early 1969 as deputy director, Plans. Dr. Haley, however, actually succeeds COL William E. Zook, who retired from the Army June 30.

Serving as Dr. Haley's successor in ODCSRDA in an acting capacity pending selection of an appointee to the PL-313 position is William Griffith, who is on loan from HQ U.S. Army Missile Command.

Four of the ODCSRDA changes are on the staff of Army Chief Scientist and Director of Army Research Dr. Marvin E. Lasser. Dr. Ivan R. Hershner is now confirmed as the assistant director for Research Programs. Until the Army reorganization that created the Office of the Deputy Chief of Staff for Research, Development, and Acquisition in May 1974—as an expansion of the Office of the Chief of R&D—Dr. Hershner was scientific and deputy director of Army Research.

Dr. Robert B. Watson, now staff assistant to Dr. Hershner, was chief of the Physical and Engineering Sciences Office of the Office of the Chief of R&D until the Army reorganization of May 1974.

Dr. Charles H. Church has been confirmed as assistant director for Technology Overview on Dr. Lasser's staff, along with Manfred Gale as assistant director for Laboratory Activities.

Dr. Church served nine years with Westinghouse Research Laboratories until he transferred to the Advanced Research Projects Agency, Department of Defense, in 1968. From June 1972 until April 1974, he was senior program manager (Advanced Concepts). In May he was loaned by ARPA to his present duty with the Army.

Gale joined the staff of what is now the Mobility Equipment Research and Development Center in 1950, a year after graduating from the University of Virginia. He has gained recognition as one of the Army's authorities on mines, countermines and sensors. Among his MERDC assignments were chief, Detection and Sensor Laboratory, and associate director of the center. Gale served since 1970 as scientific adviser in the Office of the Chief of Staff and later as technical adviser in ACSFOR. Recently he received the Army's Decoration for Exceptional Civilian Service.

Callaway Resigns to Direct Ford Campaign

Secretary of the Army Howard H. Callaway announced in mid-June his resignation, effective in July, from the office he has held since May 1973 in order to become President Ford's 1976 election campaign manager.

A 1949 graduate of the U.S. Military Academy, Callaway was originally named to the top Department of the Army post following the return to industry of former Secretary of the Army Robert H. Froehle.

An active member in numerous business, political, educational and civic enterprises, Callaway served as a civilian aide

for the Third Army Area in 1970. During 1965-67 he was representative of Georgia's Third Congressional District and in 1966 was a gubernatorial candidate.

He has also served as president of the Young President's Organization and chairman of the Council of Trustees of Freedoms Foundation, Valley Forge, PA. He is a former member of the Advisory Commission on Intergovernmental Relations and the Board of Regents of the University System of Georgia.

Crawford Succeeds Foster as ECOM Commander

MG Albert B. Crawford Jr., who has served since 1971 as project manager for Army Tactical Data Systems (ARTADS), has been named to succeed MG Hugh F. Foster Jr. upon his retirement Aug. 1 as commander of the U.S. Army Electronics Command and Fort Monmouth, NJ. MG Foster has served since May 1971.

A 1950 graduate of the U.S. Military Academy who at 46 is one of the Army's youngest 2-star generals, MG Crawford holds master's degrees in electrical engineering and industrial engineering from Stanford University. His military schooling includes the Army Command and General Staff College, Army War College, Signal Officer's Advanced Course, and the Defense Weapons System Management Course.

Considered an Army pioneer in the military use of automatic data processing and computer technology, he has served key assignments in Germany and Vietnam. Included among his military decorations are the Legion of Merit with Oak Leaf Cluster, Bronze Star Medal, Meritorious Service Medal, and the Army Commendation Medal.



MG A. B. Crawford

Haley Selected Deputy to AMC RD&E Director



Dr. Richard L. Haley

Reorganization of the Research, Development and Engineering Directorate, HQ U.S. Army Materiel Command, effective June 30, involves the following key personnel changes.

COL William E. Zook, deputy director for RD&E since 1974, retired June 30 following more than 30 years of active military service. His successor is Dr. Richard L. Haley, who served previously as science adviser to the director of Combat Support Systems, Office, Deputy Chief of Staff for Research, Development, and Acquisition. Dr. Haley assumed his new duties June 30.

Graduated from the U.S. Military Academy with a BS degree, Dr. Haley holds master's and PhD degrees in electrical engineering from the University of Pennsylvania. His move to AMC entailed transfer of PL-313 status.

Backed by 21 years of service as an officer in the Army and Air Force (transferred to AF in 1961), he was assigned to NASA in 1963 as program engineer and then as manager for Advanced Technology and Projects in the Meteorological Programs Division. He served with NASA more than five years and in 1969 became scientific adviser to the Director of Missiles and Space, Office of the Chief of R&D, HQ DA.

COL Hubert Lacquement, who served since July 1974 as executive officer, has been reassigned as commander, Pine Bluff Arsenal, AR. He is succeeded by LTC Robert J. Cuthbertson, a recent graduate of the Army War College. LTC Cuthbertson has a BA degree in public administration from Shippensburg State College.

COL Merle F. Ormond, special assistant to the director since July 1974, retired in August following more than 30 years of active service. New reorganization charts do not reflect continuation of this position. Similarly, COL Wallace H. Hubbard, R&D coordinator, retired along with his title when the Research Division was abolished.

Dr. Hamed M. El-Bisi, chief of the Research Division since 1969, was awaiting reassignment in the RD&E Directorate when the Army R&D Newsmagazine was sent to press. Prior to joining HQ AMC, Dr. El-Bisi was chief of microbiology at the U.S. Army Natick Laboratories (now the Natick Development Center).

COL Frank J. Palermo Jr., chief of Missile Systems until February, when he assumed duties as chairman, Technical Assessment Ad Hoc Group for the director of RD&E, is newly assigned as Hellfire Project Manager, U.S. Army Missile Command, Redstone Arsenal, AL.

Maus Commands U.S. Army Research Institute



COL William C. Maus

COL William C. Maus is the new commander of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), Arlington, VA. He succeeds COL Richard A. Rooth, newly assigned to the Operational Test and Evaluation Agency, Fort Belvoir, VA.

A 1955 graduate of the U.S. Military Academy, COL Maus has a 1963 master's degree in psychology from Purdue University. He has completed the Army Command and General Staff College and the Army War College, and is a recipient of

the Distinguished Service Cross.

COL Maus has served with the 32d Airborne Division; Tactical Department, U.S. Military Academy; U.S. Army Training Center, Fort Bragg, NC; J-3, HQ European Command; 51st Infantry, and 5th Special Forces Group, Vietnam.

Sanders Appointed DASD (Senate Affairs)

Secretary of Defense James R. Schlesinger recently appointed Donald G. Sanders as Deputy Assistant Secretary of Defense (Senate Affairs), Office of the Assistant Secretary of Defense (Legislative Affairs).

Sanders formerly served as project manager for the Atomic Energy Commission (now Nuclear Regulatory Commission). Other key assignments have included chief counsel and staff director of the House Committee on Internal Security; and deputy minority counsel of the Senate Select Committee on Presidential Campaign Activities.

He also was a special agent and a supervisory special agent with the Federal Bureau of Investigation for 10 years. A former captain in the U.S. Marine Corps, Sanders holds a juris doctorate from the University of Missouri, and has attended Washington University, St. Louis, MO.

Buc Named DASD (General Purpose Programs)

Secretary of Defense James R. Schlesinger recently appointed Bernard J. Buc as Deputy Assistant Secretary of Defense for General Purpose Programs, Office, Assistant Secretary of Defense for Program Analysis and Evaluation.

Buc has served since 1971 with Operations Research, Inc., and since 1973 as senior vice president of the same firm. Prior to this assignment he was director of Fleet Air Defense and Air Projection Studies with the Center for Naval Analyses, Arlington, VA. His academic credentials include a BE in aeronautical engineering from Polytechnic Institute Brooklyn, NY.

McKee Becomes Naval Academy Superintendent

Secretary of the Navy J. William Middendorf II has designated RAdm Kinnaird R. McKee as superintendent of the U.S. Naval Academy upon retirement of VAdm William P. Mack.

A 1951 graduate of the USNA, RAdm McKee is the youngest superintendent in the 130-year history of the academy. He has served since 1973 as commander, Submarine Group Eight, and Submarine Force, Eighth Fleet in the Mediterranean.

Other key assignments include executive director of the Chief of Naval Operations Executive Panel; special assistant to the Director of Navy Program Planning, Office of the Chief of Naval Operations; and assistant for Personnel and Training, Director of the Division of Naval Reactors, U.S. Atomic Energy Commission.

MG Morris Succeeds MG Raymond as Deputy COE

MG John W. Morris has been named Deputy Chief of the U.S. Army Corps of Engineers, following the retirement of MG Daniel A. Raymond. MG Morris served formerly as director of Civil Works, Office, Chief of Engineers.

Graduated from the U.S. Military Academy in 1953, MG Morris has a master's degree in civil engineering from the University of Iowa. He has completed the Army Command and General Staff College, Army War College, and is a registered professional engineer in Oklahoma.

Key assignments have included division engineer, Missouri River Division, Omaha, NB; resident engineer, Goose Bay Air Base, Labrador; deputy district engineer, Savannah, GA; and district engineer, Tulsa, OK.

MG Morris is a recipient of the Distinguished Service Medal, Legion of Merit with three Oak Leaf Clusters, Bronze Star Medal, and the Air Medal.

Weidhuner Joins Energy R&D Administration

Donald D. Weidhuner, a member of the planning group for establishment of the U.S. Army Materiel Command, and chief of the Power Branch of the RD&E Directorate since Aug. 1, 1962, departed July 14. He has accepted a GS-16 appointment as assistant director, Non-Highway Transportation Systems, Division of Transportation, Office of the Assistant Administrator for Conservation, U.S. Energy Research and Development Administration.

Weidhuner has presented numerous technical papers in the U.S. and Europe on propulsion and power technology. He is a member of the Propulsion and Energetics Panel, Advisory Group for Aerospace Research and Development, NATO; Research and Technology Advisory Committee, National Aeronautics and Space Administration; and the Society of Automotive Engineers.

Graduated in 1951 from the University of Illinois with a bachelor's degree in mechanical engineering, he received his MS degree in the same field from George Washington University in 1971. He was honored in 1969 with the Army's second highest award for a civilian employee, the Decoration for Meritorious Civilian Service.

McAdams Departs AMC for OASD Assignment

John P. McAdams, formerly employed in the Research, Development and Engineering Directorate, U.S. Army Materiel Command, has joined the Defense Materiel Specifications and Standards Office, Office, Assistant Secretary of Defense (Installations and Logistics).

Responsibilities while assigned to AMC since 1964 have recently included staff supervision of 18 Army Standardization Offices in implementing the Defense Standardization Program. A registered professional engineer in Washington, DC, he was elected as a Fellow (1974), Standards Engineers Society.

R&D Leaders Discuss Changing Procedures

(Continued from page 6)

All of us must be held accountable. . . I don't send you money. I send problems to be solved. They must be solved while maintaining ongoing programs. If more money is required, it becomes a question of coming up with it within existing financial resources—by deciding where the best return on investment may logically be anticipated."

Deputy Director (Research and Technology) Dr. John L. Allen, Office of the Principal Deputy Director of Defense R&E, Office of the Director of Defense Research and Engineering, reported on the DoD Laboratory Utilization Study and the differences in operation of Army, Air Force and Navy labs.

The objective of the study, he explained, was to identify requirements for DoD labs, excess capacity, overlapping capabilities and programs, shortfalls, and instances of where R&D might be advantageously contracted to industry from a cost viewpoint. The philosophy, he said, was to rely on industry to play a strong role in developing technology for military needs.

Army labs, the study showed, are the most heavily "in-house oriented," have the strength of aggressive management systems, but lack the benefit of a sufficient number of military officers highly trained in R&D activities. Some of the Army labs, he said, are among the best in the nation while others are in need of upgrading their programs.

COL Tenho R. Hukkala, commander of the first of the eight planned development centers, the Mobility Equipment R&D Center established early in 1975 at Fort Belvoir, VA, without any change of name, reported on the realignment of functions and resources for operation of the MERDC.

Known for many years as the Mobility Equipment R&D Laboratories, the MERDC was followed shortly by creation of the Natick (MA) Development Center, an outgrowth of the Natick Laboratories. COL Hukkala said the estimated time for com-

(Continued on page 32)

Awards . . .

1974 Pace Awards . . .

Honor 2 DA Employees for Individual Achievement

Secretary of the Army Howard H. Callaway has presented the 1974 Pace Awards to MAJ Patrick A. Metress, Office, Assistant Chief of Staff for Intelligence, and I. Stanley DeGroote, Office Deputy Chief of Staff for Logistics (DCSLOG).

Initiated in 1963, the awards are named in honor of former (1950-53) Secretary of the Army Frank Pace Jr. Special recognition is given annually to one Army officer and one civilian employee for a "contribution of outstanding significance" during the previous calendar year. Individual rather than team accomplishment is required.

MAJ Metress was recognized specifically for his achievements in planning and applying a sophisticated technical intelligence collection system to the Army's tactical battlefield requirements. The award citation credits him with introducing revolutionary technological developments.

Additionally, MAJ Metress was praised for his high degree of professionalism, technical expertise in advancing national intelligence capabilities, and "extraordinary qualities of intellect, imagination, dedication to duty, and personal initiative."

Graduated from John Carroll University with a 1960 BS degree in history, he has a 1965 MA degree in government and a 1972 PhD in international relations, both from New York University. His military education includes the Army Command and General Staff College, and the Army Infantry and Transportation Schools.

I. Stanley DeGroote, backed by 11 years of federal service, was cited for distinguishing himself during CY 1974 by exceptional performance of duty while assigned to DCSLOG's International Logistics Directorate.

He was credited with demonstrating "exceptionally creative managerial ability, sound judgment and professional acumen" while directing the Army's Iranian and Korean Foreign Military sales program, valued at over two billion dollars. Additionally, he initiated new policies which improved the management of the Military Assistant Program under his supervision.

DeGroote graduated from Washington University in 1947 with a BS degree in business administration and has done post graduate work at Ohio State University. During 1964-68 he served as chief, Military Sales Branch, U.S. Army Troop Support Command, St. Louis, MO.



PACE AWARD winners I. Stanley DeGroote and MAJ Patrick A. Metress flank Secretary of the Army Howard H. Callaway. At the right is former Secretary of the Army Frank Pace Jr.



ASSISTANT SECRETARY OF THE ARMY (R&D) Norman R. Augustine congratulates Vahey S. Kupelian after presenting the U.S. Army's highest award for a civilian employee, the Decoration for Exceptional Civilian Service. MG R. C. Marshall, Ballistic Missile Defense project manager, whom Kupelian serves as technical assistant for interceptor technology, observes. The award citation credits Kupelian with outstanding contributions to the conception, development and direction of major BMD programs such as UpSTAGE (Upper Stage Acceleration Guidance Experiment), Hardpoint Defense Interceptor, Long-Range Homing Interceptor, and Homing Interceptor Technology. Kupelian was assistant director, Advanced Ballistic Missile Defense Agency and chief of the Missile Development Division, July 1968 to May 1974. Initiator, technical director and manager of the 10-year UpSTAGE program, he was nominated in 1972 for the EASCON Aerospace Man of the Year for this work.

Former PA Commander Named to AO Hall of Fame

COL John P. Harris, one of four recent inductees into the U.S. Army Ordnance Hall of Fame, is a former commander of Picatinny Arsenal and the first Picatinny representative to earn this distinction.

Other selectees are GEN Henry A. Miley Jr., recently retired commander of the U.S. Army Materiel Command; retired Army COL Lesley Skinner, developer of the 2.36-inch bazooka; and the late J. Walter Christie, inventor of a tank suspension system.

COL Harris was a member of the joint British/Canadian/U.S. Committee on Propellants and Explosives during WW II, and served for more than 18 years at Picatinny Arsenal.

During WW II duty in the European and Pacific Theaters, he was a special representative of the Chief of Ordnance in reorganizing methods of packaging, shipping and handling ammunition that resulted in drastic changes in packaging.

NDC Textile Chief Wins AATCC Chapin Award

Outstanding service to the American Association of Textile Chemists and Colorists (AATCC) has earned the 1975 Harold C. Chapin Award for Frank J. Rizzo, U.S. Army Natick (MA) Development Center.

Established in 1958, the award is presented annually to a senior member of AATCC for outstanding contributions over a 20-year period. It honors Dr. Harold C. Chapin, retired chemistry professor and former AATCC national secretary for almost 25 years. Award recipients are selected by unanimous vote of a committee of senior AATCC members.

The AATCC is the world's largest technical and scientific society devoted to the application of colors and finishes to textiles. Founded in 1921, it has more than 9,000 members.

Rizzo, who has been in Army textile research since 1946, is chief of NDC's Textile Research and Engineering Division, Clothing, Equipment and Materials Engineering Laboratory. His responsibilities encompass a broad range of items including clothing, equipment, tentage and parachutes.

Author of more than 70 technical papers, Rizzo is a member of the American Chemical Society, American Society for Testing and Materials, Intersociety Color Council, Optical Society of America, Society of Dyers and Colourists, and the Research Society of America.

ON KNOWLEDGE: "What is all our knowledge worth? We do not even know what the weather will be tomorrow."

Berthold Auerbach

Dr. Bennett Named NY Science Academy Fellow



Dr. Herbert S. Bennett

Scientific achievements have earned Dr. Herbert S. Bennett recognition as a recently elected Fellow of the 158-year-old international New York Academy of Sciences. He is adviser to the director of the Communications/Automatic Data Processing Laboratory, U.S. Army Electronics Command.

Dr. Bennett served with the U.S. Army Signal Corps from 1939 to 1952, holding engineering and engineering management positions, including five years of active Army duty. During 1952-61, he was employed on the senior technical staffs of ITT Laboratories, A. B. Dumont

Laboratories, and the Bendix Corp.

He is credited with establishing the first biomedical engineering graduate course, since extended to the doctorate level, at Polytechnic Institute of Brooklyn (PIB). Dr. Bennett also conducted original research in biomedical engineering, systems science, and cybernetics.

A registered professional engineer in New Jersey, he has bachelor's and master's degrees in electrical engineering from the City University of New York, and a master's degree in physics and a PhD in engineering from PIB.

Included among his professional affiliations are the National Society of Professional Engineers, the Biomedical Engineering Professional Group of the Institute of Electrical and Electronics Engineers, Sigma Xi, Tan Beta Pi, and Eta Kappa Nu.

Rengstorff Awarded A Prefix for Proficiency

LTC Roy E. Rengstorff, assigned to the Biomedical Laboratory, Edgewood Arsenal, Aberdeen Proving Ground, MD, is a recent designee for the "A" Prefix, the highest certification of professional proficiency for U.S. Army medical officers.

Serving as the Army's representative to the American National Standards Institute Committee on contact lenses and eye and face protection, he is nationally recognized as a research optometrist. In a recent address to the 14th meeting of the Heart of American Contact Lens Conference in Kansas City, MO, he spoke to more than 400 specialists on "Eye Protection" and "Corneal Curvature of Contact Lens Wearers."

ARMCOM Men Earn Achievement Certificates

Department of the Army Certificates of Achievement were awarded recently to John B. Todaro and Dr. Thomas H. Short, employees at the U.S. Army Armament Command (ARMCOM).

Presented for work with the Decision Risk Analysis Team, Fort Lee, VA, Todaro's and Dr. Short's citation reads in part, "for significant contributions to the timely, efficient and economical acquisition of quality supplies and services."

Assigned to Rock Island since January, Todaro is chief of the Production and Mobilization Planning Division, Decision Modeling Directorate, Joint Conventional Ammunition Program (JCAP). Other honors include a 1973 Outstanding Performance Award and a 1974 Quality Step Increase.

Dr. Short, also assigned to JCAP, is an operations research analyst in Item Acquisition and Materiel Planning, Decision Modeling Directorate. Previous assignments have included physicist, Fire Control Group, ARMCOM, and mechanical engineer, U.S. Army Tank-Automotive Command.

FRG Honors Edgewood Arsenal Commander

The Federal Republic of Germany Commander's Cross of the Order of Merit was awarded recently to COL Kenneth L. Stahl, commander of the U.S. Army Edgewood (MD) Arsenal. FRG Ambassador Berndt von Staden made the presentation.

COL Stahl was honored for service to the FRG while serving as commander of the Combat Developments Command's Chemical, Biological and Radiological (CBR) Agency at Fort McClellan, AL. He was cited for supporting information exchanges between the CDC, German liaison staff, and the German CBR Defense School.

Dr. Harris Presented Meritorious Service Award

Dr. B. L. Harris, technical director of the U.S. Army Edgewood (MD) Arsenal since 1970, was honored recently with the Decoration for Meritorious Civilian Service (DMCS), the Army's second highest award for civilian employees.

Cited for exceptional professional performance and inspirational leadership which optimized Edgewood's scientific and engineering programs, he is a former professor of chemical engineering at Johns Hopkins University.

Dr. Harris began his Federal Civil Service career at the arsenal in 1952. He is credited with establishing the Edgewood Arsenal Technical Board, a scientific and technical reviewing body, and various other innovative procedures to improve management of research and development.

TECOM Engineer Chief Receives Army DECS

Benjamin S. Goodwin, chief engineer at the U.S. Army Test and Evaluation Command (TECOM), Aberdeen Proving Ground, MD, recently received the Decoration for Exceptional Civilian Service, the Army's highest award for employees.

TECOM Commander MG Charles P. Brown made the presentation, referring to Goodwin's 1965-74 performance of duties while serving as a technical adviser. Employed at APG in a civilian capacity since 1946, Goodwin has a BS degree from Georgia Institute of Technology.

ECOM Employee Elected as IEEE Fellow

Irving Reingold, a supervisory engineer in the Electronics Technology and Devices Laboratory, U.S. Army Electronics Command (ECOM), Fort Monmouth, NJ, has been elected as a Fellow, Institute of Electrical and Electronics Engineers.

Recognized for his research in display and microwave devices, he has presented or published approximately 50 technical papers, holds 10 patents, and was a 1962 recipient of an Army Research and Development Technical Leadership Award.

Reingold is a Fellow of the Society for Information Display, secretary of the IEEE Group on Electronic Devices Administrative Committee, a member of the IEEE Press Editorial Board, and has served as guest editor of special issues on display devices of the IEEE *Transactions on Electron Devices*.

AMC Budget Analyst Cited for Achievements

Maxine L. Aiken, a program and budget analyst in the Research, Development and Engineering Directorate, HQ U.S. Army Materiel Command, was a June 23 recipient of the Decoration for Meritorious Civilian Service.

Army Materiel Command Director of Research, Development and Engineering BG Harry A. Griffith presented the award. Mrs. Aiken was recognized specifically for her "development of programing procedures which greatly increased the efficiency and effectiveness of the Army R&D program." Additionally, she was cited for broad technical expertise, effective cooperation with others in preparing the RD&E budget, innovative thinking, and dedication to duties.

Watervliet CO Named PM for M60 Tank Production

Priority emphasis on the M60 Tank Production Acceleration Program caused COL Richard H. Sawyer to switch field rapidly in mid-July when he was named as the new project manager—less than a week after a news release announced his selection to head a major U.S. Army laboratory complex.

Commander of the U.S. Army Watervliet (NY) Arsenal for two years, COL Sawyer will assume his new duties in August at HQ U.S. Army Tank-Automotive Command, Warren, MI, as successor to newly promoted BG Donald M. Babers.

While at Watervliet COL Sawyer was recognized for markedly increasing production of 105mm guns to meet accelerated demands of the M60 tank program; also, for progress in development of the 60mm lightweight company mortar system, which has passed advanced and engineering development tests and is now ready for operational testing.

He has a master's degree in mechanical engineering from Purdue University, and is a graduate of the Command and General Staff College as well as the Industrial College of the Armed Forces.

Career Programs . . .

8 DA Civilian Employees . . .

Selected for 1975-76 Senior Service Colleges

Included among eight Department of the Army civilian personnel selected to attend three top senior service colleges during 1975-76 is the first U.S. Army Materiel Command female employee to go to the Industrial College of the Armed Forces.

Selectees were screened by the DA Executive and Professional Development Committee, composed of Deputy Assistant Secretaries of the Army for Manpower and Reserve Affairs, R&D, Installations and Logistics, and Financial Management; and the director of Civilian Personnel and deputy director of Military Personnel Management.

NATIONAL WAR COLLEGE (NWC), Fort McNair, Washington, DC, is a graduate level interservice school for key senior military, civilian, and State Department personnel. Training is provided for persons involved in high policy command and staff functions and national strategy planning.

Ronald A. Patek, NWC selectee, is chief of the Systems Engineering Division, RD&E Directorate, U.S. Army Tank-Automotive Command (TACOM), Warren, MI. Responsibilities include directing and managing major R&D programs for surface mobility systems. Programs range from basic research (6.1) to full-scale production engineering.

Patek has more than 25 years of federal service, including experience involving major studies of the M551 Sheridan engine and M715 versus the M705 truck. He is credited with providing major TACOM input to the Army Materiel Acquisition Review Committee (AMARC).

He earned a BS degree in electrical engineering from the University of Detroit in 1951 and an LLB from Wayne State University in 1956. Admitted to the Michigan Bar in 1957, he is a member of Delta Theta Phi professional law fraternity.

INDUSTRIAL COLLEGE OF THE ARMED FORCES (ICAF), Fort McNair, Washington, DC, conducts graduate-level courses in national security, with emphasis on management of national resources. ICAF selectees are:

Mary Ellen Harvey, who has earned the distinction of being the first AMC female employee selected for the ICAF, is assigned as deputy director of the U.S. Army Equipment Authorizations Review Activity. Miss Harvey has a total of 11 years of federal service and has a BA degree in chemistry from Immaculata College. A comprehensive article on Miss Harvey appears in the May-June edition of the *Army R&D Newsmagazine* (Women in Army Science).

Arthur T. Walker is serving as chief, Budget Operations Branch, Budget Division, Office of the Comptroller, HQ AMC. He is responsible for development, presentation and execution of the AMC Operation and Maintenance Army (OMA) and Army Industrial Fund (AIF) budgets. These budgets service approximately 100,000 civilian employees.

Backed by 16 years of federal service, Walker has a 1958 BA degree in commerce from Loras College and a 1970 master's degree in business administration from Syracuse University. He is a member of the Association of Military Comptrollers (Washington, DC, chapter), and the Association of Syracuse Comptrollers.

Rob R. McGregor, a federal service employee for 11 years, is chief, Cost Analysis Division, Office of the Comptroller, U.S. Army Tank-Automotive Command, Warren, MI. He is assigned responsibility for directing and reviewing command cost analysis of major weapon systems projects.

McGregor has a BS degree in engineering from the U.S. Military Academy, an MS degree in physics from the U.S. Naval Post Graduate School, and has done post graduate work at Wayne University. During 1964-70, he served as director of TACOM's Physical Sciences Laboratory.

John C. Cittadino is deputy project manager for Navigation/Control Systems (NAVCON), HQ U.S. Army Electronics Command, Fort Monmouth, NJ. Federally employed for 19 years, he is responsible for development and implementation of project management policies, plans, and requirements.

Cittadino obtained a BS degree in mechanical engineering from Newark College of Engineering in 1955, and an MS



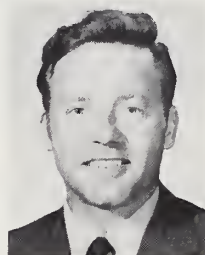
John C. Cittadino



Arthur T. Walker



Ronald A. Patek



Raymond V.
Michael



Mary Ellen Harvey



Lewis G. Aron



Gerald A. Yager



Rob R. McGregor

degree in engineering management and operations research from Stevens Institute of Technology in 1964. Noted for his contributions to the Army Space Program, he has authored papers on satellite communications and air traffic control.

Gerald A. Yager is chief, Contracts Office, U.S. Army Research Institute for the Behavioral and Social Sciences. He served previously as a materiel acquisition specialist in the Office, Assistant Secretary of the Army (Installations and Logistics).

His academic credentials include a 1954 BS degree in business administration from the University of Maryland and an MBA degree from George Washington University. Backed by 18 years of federal service, Yager has had experience in procurement planning of major U.S. Naval weapons systems.

ARMY WAR COLLEGE (AWC), Carlisle Barracks, PA, offers a course of instruction to prepare graduates for senior command and staff positions throughout the defense establishment. AWC promotes understanding of the art and science of land warfare. The AWC selectees are:

Raymond V. Michael a federal service employee for 13 years, has been assigned as chief of the Civilian Personnel Office, U.S. Army Garrison, Okinawa, since 1973. He provides the full range of personnel administration for appropriated and nonappropriated U.S. civilian employees (about 1,000 total).

Listed in the 1961-62 edition of *Who's Who in American Colleges and Universities*, Michael has a BA degree in political science from West Virginia University, and an MA degree (magna cum laude) in international relations from the University of the Americas.

Lewis G. Aron is serving as general counsel, U.S. Army Korea Procurement Agency (KPA), Seoul, Korea. He provides legal expertise to support the commander, Eighth U.S. Army and is the KPA's representative on the "Status of Forces Agreement Commerce Subcommittee."

Aron earned a BS degree in electrical engineering from Brown University in 1959 and a doctorate from George Washington School of Law in 1963. His 15-year federal career includes assignments as general counsel, U.S. Army Computer Systems Command, Fort Belvoir, VA, and attorney adviser, Office of the Chief Counsel, U.S. Army Electronics Command.

13th National JSHS . . .

(Continued from page 15)

his activity to reading "a great many books and magazine articles" until he entered his first research project this year. He took first place in the Wisconsin regional JSHS.

Then he won second place in the regional International Science and Engineering Fair. He submitted an article published in March in *Sky and Telescope*, the largest astronomical magazine in the world. He also has been working in the field of computer graphics. Hobbies: 4-dimensional geometry and collecting the basic elements of the earth (has 38 out of 96 to date).

ACKNOWLEDGEMENTS. Success of the NJSHS each year is the result of many months of planning and cooperation between the U.S. Army Research Office, Research Triangle Park, NC, as sponsor on behalf of the Department of the Army, and U.S. Military Academy officials.

The Army Research Office (ARO) is part of the Army Materiel Command. GEN John R. Deane Jr., AMC commander, and MG George Sammet Jr., deputy commander for Materiel Acquisition, serve as honorary members of the Advisory Committee.

Other honorary members this year were COL Lothrop Mittenhall, commander of the ARO; COL Edwin Patterson, associate dean, U.S. Military Academy; Dr. Sherwood Githens Jr., senior adviser to the JSHS, of Duke University; and Don Rollins, JSHS Program director.

Mrs. Anne Taylor of ARO serves as executive secretary of the Advisory Panel. ARO Planning Committee members this year included LTC Edward J. Downing Jr., ARO executive officer; CPT Elwood Ayards, adjutant, and James P. Williams Jr., administrative assistant. LTC Robert LaFrenz was the USMA project officer.

Advisory Committee members for 1975 are Dr. Marcus Hobbs, Duke University; Mrs. Adalie Brent, Oregon State University; Dr. Edward M. Eyring, North Carolina State University; Dr. Robert B. Gaither, University of Florida; Franklin Kizer, Commonwealth of Virginia State Department of Education; George F. Leist (USA, Ret.), known as originator of the concept for the JSHS Program; Dr. Harry L. Levy, Duke University; Dr. Maynard Miller, Michigan State University; and Dr. Robert H. Rines, The Academy of Applied Sciences.

MG Sidney B. Berry, U.S. Military Academy superintendent, addressed a welcome as host which stated in part: "... Your selection to participate in this National Junior Science and Humanities Symposium is a high compliment and an accomplishment of which you can be proud. . . . I congratulate you on being a member of this select group. . . ."

SPEECH SUMMARIES: Dr. Edward Teller's highlight address, "Energy: A Program for Today," emphasized his conviction that unless the United States takes progressive action on a long-range energy program, our nation "may go down the drain as a world power by the year 2000."

An adequate long-range program, in his opinion, could take as long as 60 years to become fully effective for the nation's continually mounting energy requirements. But in 30 years, by maximum effort, a great deal can be done to develop new energy sources, and to learn to use energy wisely.

Currently, Dr. Teller said, the U.S. is importing about 20 percent of its oil requirements as compared to 50 percent for Europe and 90 percent for Japan. Of the world's great powers, only Russia can afford to export oil.

The prospect for the U.S. and other oil-deficient nations, in Teller's opinion, is "hard times, desperate times. The first and most effective action that can be taken is to conserve energy in every possible way. We are making a great effort. But we must do more, a great deal more. . . . We overheat and over air condition our homes, offices, other buildings. . . ."

The automobile industry drew his sharp criticism for neglecting to think more about energy conservation, about gas-saving engines and devices, about building smaller, better-engineered cars, more than a quarter of a century ago. He advocated stronger enforcement of speed limits for efficient use of fuel.

Greatly improved technology for mining and the use of coal is one of the more immediate ways of alleviating the energy shortage, he said, pointing to the fact that the U.S. has 10 to



JSHS PROGRAM ADVISORY COMMITTEE members present at 13th NJSHS included (l. to r.) Dr. Maynard Miller, Dept. of Geology, Michigan State U; Dr. Thomas P. Evans, Dept. of Science Education, Oregon State U; Dr. Ralph Fadum, School of Engineering, North Carolina State U; Dr. Robert B. Gaither, Dept. of Mechanical Engineering, U of Florida; Dr. Robert H. Rines, president, Academy of Applied Science, Boston, M.A.

20 times more coal resources than oil resources.

Still he contended that full-scale development and similar advances in technology to extract oil and gas from known resources, can make vast supplies available, particularly by exploiting continental shelf resources under the sea as far as 50 miles from shore.

Nuclear reactor power plants used on a greatly expanded scale also present a more immediate approach to alleviating the energy shortage, Dr. Teller believes, along with greatly improved technology for extraction of oil from immense shale deposits. Nuclear Power plants are safe, he said, pointing to the record of accident-free operation despite rapid growth in the U.S. of such power generation.

Many of the views expressed by Dr. Teller's address, it was announced, are detailed in his report to the Commission on Critical Choices. Copies of "Energy, a Program for Action," can be obtained by writing to the commission at 22 West 55th Street, New York City. The cost is \$2.00 a copy.

Dr. Norman J. Doorenbos opened his featured address, Cannabis—A Mysterious Plant," by expressing appreciation to Don Rollins, director of the JSHS Program, for the opportunity to address a national gathering of such exceptionally gifted science students.

Introduced by MG George Sammet Jr. as the only man in the United States authorized by the President (Lyndon Johnson in 1968) to grow marijuana for research, Dr. Doorenbos now has a staff of 19 students working toward doctorates, a faculty of 5, and 18 undergraduate research assistants.

Dr. Doorenbos said the University of Mississippi laboratory now produces all of the U.S. and 50 percent of the world supply of marijuana used for research. The first crop in 1968 was used to develop analytical procedures, with some later chemical studies. Animal studies began in 1969 and human research in 1970, when the first crop of known chemical content became available.

Dr. Doorenbos said that despite the carefully documented evidence during the past four years of the danger of marijuana's enduring damage to human health—such as permanent brain damage and effects upon the kidney functions—a great deal more research is needed for fully conclusive findings.

Toxins from many common foods may be more harmful and, in many cases, fatal. The physical effects of food toxins, he said, is one of the most fascinating and intensive of the research tasks of his group.

An example he cited is the 24-hour-a-day study for the past six months on the toxin produced by a new variety of potato when its skin is damaged. Evidence has been established that the toxin resulting from biosynthesis when the potato is damaged may be responsible for birth defects when consumed by pregnant women.

Similarly, when the kidney and liver fail to function as they should in purifying certain food chemicals, by enzymatic detoxification before they enter the blood stream, such foods as a banana, a hamburger or a steak could prove fatal. Enzymes in the lungs also perform a vital function.

Stressing that toxins research at the University of Mississippi is directed to the discovery or synthesis of therapeutic

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SCIENCE IN THE 1980s was the subject of featured speaker CPT James H. Stith, professor of physics, USMA.



SOCIAL SETTINGS OF SCIENCE was the topic of Dr. Seymour Mauskopf, associate professor of history, Duke Univ.

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drugs, he said that about half of these drugs sold in stores are derived from plants or foods. Synthesis accounts for the others.

Drugs and toxins reactions within the human body vary widely in individuals, he said, in that no two humans are precisely the same in physical structure and chemical responses.

Each individual has a distinctive body odor, a fact that explains why bloodhounds can trace fugitives. He cited that this explains also how a mother seal can find and feed her cub among as many as 50,000 cubs.

Although the major portion of his address was devoted to the research program on the widely varying types and chemical characteristics of marijuana, along with its possible permanent effects upon the human body, Dr. Doorenbos discussed amphetamines and various other foods or chemicals used by those seeking a means of "taking a mental trip."

Among numerous examples he mentioned are the skins of bananas when converted to a smokable material, toothpaste, and nutmeg (described as an extremely powerful and physically dangerous hallucigen—"tears up your insides and can possibly lead to death").

Marijuana's mysterious qualities, as he described them, include the fact that the chemical potency of a particular variety may prove identical when grown in widely differing climates, or may be more potent in certain areas.

One of the strange discoveries he reported was that a plant

grown in the closet of a prison with the aid of a lamp bulb—a pale, spindly plant about six or seven feet tall—had about double the potency of the same variety when grown under favorable conditions.

Another startling discovery of his group was the contradiction of the worldwide belief that only the female variety of marijuana was potent as a hallucigen. Their tests showed that the male species may be equally potent, and this finding has been confirmed by researchers in many parts of the world.

Prior to initiating the current research program, Dr. Doorenbos said he read about 4,000 technical reports and journal articles on research findings of others to provide as broad an understanding as possible of marijuana. His address was illustrated by the showing of various varieties grown in different parts of the world, including some plants about 40 feet tall.

Based on results of the research of his group to date, Dr. Doorenbos expressed himself as opposed to legalization of "this extremely dangerous drug." He said evidence supports the belief that marijuana is probably potentially much more destructive to the human body than alcohol or smoking.

In addition to permanent brain damage, he said this drug may cause sterility in males and lead to the growth of breast tissues. In females it may cause "weird birth defects" or lead to cancer; it may weaken the body to other diseases.

During his discussion of the broad range of research tasks performed by his group, Dr. Doorenbos listed, as a significant result, the development of a breed of poppy that can supplant the heroin (opium) producing type that is currently an important economic crop in numerous countries.

The new variety has actually "been around a long time," he said, but has been refined so that its leaves now be used as a food and for numerous economic products. However, it cannot be readily used to produce heroin.

R&D Leaders Discuss Changing Procedures

(Continued from page 27)

pletion of all phases of the ultimate concept of operation of the DC ranges from two to five years.

Dr. Robert S. Wiseman, Electronics Command deputy for laboratories, submitted a lengthy report on ECOM's experiences, ongoing practices and program results as one of the four laboratory organizations originally selected for application of Project REFLEX (Reconciliation of Workloads, Funds and Manpower).

Norman L. Klein, deputy for Science and Technology to MG Sammet, moderated the meeting and commented on expansion of the REFLEX program, initiated in 1970 as an experimental developmental effort, to all AMC labs. Klein commented that "we must maintain a viable in-house R&D capability."

David Barnett, chief, Force Accounting and Allocations Branch, AMC, discussed progress in "Reflex Management."

A presentation on "Personnel Management by Marvin R. Sykes, executive secretary of the U.S. Army Engineers and Scientists Career Field Program, was followed by a report by Dr. Herman R. Robl, chief scientist of the Army Research Office, Research Triangle Park, NC. Dr. Robl discussed ARO's responsibilities for assessment of AMC in-house laboratories basic research programs.

Army Chief Scientist and Director of Army Research Dr. Marvin E. Lasser explained his concept of responsibilities and operations of his staff under the over-all direction of Deputy Chief of Staff for Research, Development and Acquisition LTG Howard H. Cooksey. He stated, in part:

"We feel that we have to get out of the task-by-task involvement in the technology base, now that the laboratory directors have the responsibility, under REFLEX, to cut out the low-priority activities. Each laboratory director has to determine his program goals.

"Our job is to get knowledge of the needs of users and pass them along to you, not as an intervening agency. Our plan is to give you a fixed amount of funds and let laboratory directors make the decisions on programs. We will maintain the over-all program balance. . . ."

Amplifying Dr. Lasser's views, as the concluding programmed speakers, were two of his key staff members, Dr. Charles H. Church, assistant director for Technology Overview, and Manfred Gale, assistant director for Laboratory Activities.

Dr. Church discussed "The Army's Technology Base" including coordination of actions of LTG Cooksey's staff and other major Army agencies, responsiveness to priority goals, and cooperation with industry in operations of the Army Advanced Concepts Team. Gale spoke on research planning, programing, the budgeting cycle, establishing of priority objectives, and approaches to problem areas.



Robert Barnes & Tom East beautiful classical music. "I have never felt sorry for myself," he commented.

NO OBSTACLES TO SUCCESS are permitted to find harbor in the minds of these two NJSHS participants. Robert Barnes, 18, a student at the Arkansas School for the Blind, was selected as a member of the Arkansas delegation for his paper on "Extension of Set Theory," a concept to add another dimension to the system of set mathematics, and to make it more completely applicable to different forms of problems.

Blind since birth, Bob turned for relaxation to the grand piano for the Hotel Thayer's main ballroom near midnight one evening. Alone for a few moments, he was soon surrounded by silent students listening to his rendition of beautiful classical music.

TOM EAST, 18, graduated in June from St. John's H.S. in Toledo, OH, plans to do his undergraduate work at John Carroll U. in Cleveland, and graduate studies at Massachusetts Institute of Technology. His goal is a doctorate in physics. His research project involved design and construction of a laser communication system, which earned him second place in the Ohio JSBS and made him a finalist in the Westinghouse Science Talent Search.

Until Tom developed bone cancer at the age of 10, his father, now a professor of music at the University of Toledo, was a celebrated opera singer in Darmstadt, Germany, under a Fulbright study scholarship. Doctors said Tom's bone tumor was one of the largest on record.

"Being an amputee is no big deal," Tom commented. "I daily thank God for being alive. I swim. I ski. I like to help other amputees, particularly children. I can do anything I want to do! I intend to compete in the 1976 National Amputee Ski Races in Colorado."

TECOM Gets Computerized Radar

By William B. Milway

TECOM Instrumentation Directorate

Testing of the new AN/TPQ-39V Digital Instrumentation Radar (DIR) since it was delivered to the Yuma (AZ) Proving Ground of the U.S. Army Test and Evaluation Command, Oct. 29, 1974, has proved it is an outstanding success of joint Army, Navy, Air Force development—with substantial savings to the government.

Management of the program was provided, from start to finish, by a Tri-Service Working Group representing TECOM, the Air Force Flight Test Center (AFFTC), Naval Air Systems Command (NASC), and the Air Force Space and Missile Test Center (SAMTEC). Development costs were shared equally and SAMTEC acted as the lead agency. The TECOM development contract was with RCA Corp.

The design approach was to develop a basic radar system which could be tailored to individual applications by addition of a variety of elective features. This concept allowed the maximum inter-service cooperation and was essential in meeting cost objectives.

In addition to each service providing funding and project management, the specific technical expertise and experience of each of the participating agencies were utilized in design and fabrication of the radar.

The DIR is a computerized radar (a Data General, Nova 800 with 16.k of memory) in the real sense of the term with all servo loops closed through the computer. Many other radar and control operations are handled by the computer, resulting in savings of cost and size while increasing flexibility and ease of operation.

A double-bayed operator's console operated by one technician provides full control of the radar to acquire and track targets, to select modes of radar operation, to calibrate the radar, and to monitor performance.

The radar can be operated in fully automatic mode from search for the target, through acquisition, to comple-

ITEM	SPECIFICATION	MEASURED
Transmitter Power	250KW min.	268KW min.
Transmitter Pulse Coding	2	2
Transmitter Tuning Range	5450-5825MHz	5432-5825MHz
Transmitter Pulse Jitter	0.01 μ sec	0.005 μ sec
Antenna Gain	36 dB min.	36.5 dB
Antenna Beamwidth	2°	2°
Antenna Depth of Null	25 dB min.	36 dB
Antenna Sidelobes	-17 dB min.	-20 dB
Pedestal Coverage, Elevation	-5° to + 185°	-5° to + 185°
Pedestal Coverage, Azimuth	$\pm 360^\circ$	$\pm 360^\circ$
Azimuth Tracking Rate	500 mils/sec	525 mils/sec
Elevation Tracking Rate	500 mils/sec	505 mils/sec
Azimuth Acceleration Rate	300 mils/sec ²	> 350 mils/sec ²
Elevation Acceleration Rate	300 mils/sec ²	> 350 mils/sec ²
Azimuth Tracking Precision at 20 dB S/N	0.5 mils, RMS	0.15 mils, RMS
Elevation Tracking Precisions at 20 dB S/N	0.5 mils, RMS	0.06 mils, RMS
Range Tracking Precision at 20 dB S/N	5 yds, RMS	4.5 yds, RMS
Range Tracking	125 nmi	125 nmi
Receiver Noise Figure	7 dB max.	6.8 dB
Maximum Range, 6-inch Sphere	34,000 yds	41,000 yds
Reliability (Design Goal) — MTBF	150 hours	—

Specified Parameters for the AN/TPQ-39 (V), Along With Measured Test Data Collected by RCA on Sept. 12, 1974.

tion of tracking. It can also be operated in a fully manual mode, or in any combination of these two modes. Align, calibrate and coast modes are also provided.

The computerized design also gives the AN/TPQ-39V the advantage of great flexibility in the variety of range functions it can perform. By simply reprogramming the computer, an operator can adapt the DIR to various range uses.

The DIR is self-contained in a single S-280 military shelter with a roof-mounted parabolic reflector six feet in diameter. This reflector folds down for stowage and transportation. The radar operates in the H-band (old C-band), which makes it compatible with the majority of instrumentation systems.

The DIR shelter installs on any firm, level site and requires no concrete pad or other permanent construction. The power requirement for the system is only 18 kilowatts, making it possible for a single truck to transport both the radar and the prime power for remote site operation.

The prime power provides shelter heating and air-conditioning for full environmental control in any climate. Since the system is transported as a single integrated unit, no special tools or equipment are needed for emplacement. Four hours after the system arrived at Yuma, it was tracking targets of opportunity.

Performance specifications of the DIR are summarized in Table 1 as well as some of the values measured by RCA during testing. A further test program, sponsored by the Navy, is in progress to measure fully the performance of the

radar in an operational environment.

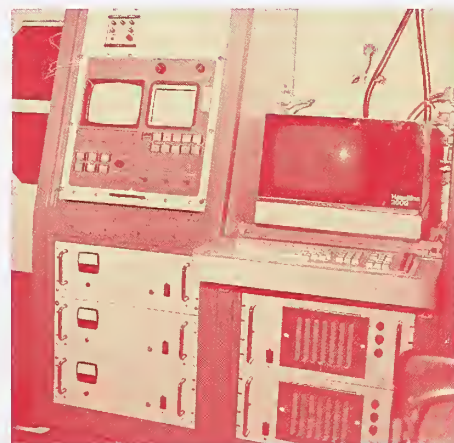
The DIR will be utilized at Yuma PG to track aircraft and other aerial targets. It will also provide the capability to track and measure the space position of artillery projectiles fired from the KOFA Firing Range.

Collected data will be integrated into the USAYPG Real Time Data System along with data from other instruments such as laser trackers and cinetheodolites.

Because of the high reliability and economical operation of this radar, a considerable cost saving is expected to be obtained, thereby making range operation at USAYPG more efficient and TECOM more responsive to customers.



Exterior view of DIR showing antenna atop the S-280 shelter.



Interior view of DIR showing operator control station. The operator converses with the radar through the keyboard and graphic display at the right.



Apollo-Soyuz Space Link-Up . . .

27 NDC Preserved Foods Will be Used on Historic Flight

Food supplies for U.S. astronauts who will attempt with Soviet crewmen an historic link-up of space vehicles in the Apollo-Soyuz Test Program (ASTP) in July will include 27 irradiated, freeze-dried or thermo-processed items provided by the U.S. Army Natick (MA) Development Center (NDC).

Twenty-one of the food items will be representative of a U.S. prototype military ration, the individual ready-to-eat meal recently type classified as standard. This means that the meal is ready for production and distribution as satisfac-

tory for military use.

ASTP items from this prototype ration are freeze-dried strawberries, peaches, pears and compressed freeze-dried vegetables (spinach and peas). The thermally processed items that the astronauts selected are beef and gravy, turkey and gravy, beef slices with barbeque sauce, chicken ala king, frankfurters, cherry-nut and chocolate-nut cakes.

Four additional NDC items will be irradiated meats and two will be condiments. A "bonus" is irradiated bread, developed by the NDC in cooperation

with the University of Nebraska. Soviet astronauts will have their own space flight foods but each one of them will sample one U.S. meal. One of the cosmonauts selected irradiated beefsteak as the entree for this meal.

Previous astronauts on Apollo flights have favored NDC-developed freeze-dried chicken and rice, spaghetti and meat sauce, beef stew, chicken stew, and pork with escalloped potatoes.

The flexibly packaged foods have been service tested by the U.S. Army Infantry Board at Fort Benning, Fort Bragg, the Arctic Test Center in Alaska, and by the Marines. They can be warmed by immersion in hot water. Military consumers rated them highly for appearance, taste, light weight and convenience—all factors being important for the space flight.



Artist's sketch of link-up in Apollo-Soyuz space mission.

MICOM Establishes Technical Industrial Liaison Office

Industrial representatives desirous of competing for a part of the U.S. Army Missile Command's disbursement of nearly \$2 billion a year for R&D supplies and services have a recently established focal point to inform and assist them in the Army materiel acquisition process.

MICOM is a rather large-scale installation—about 2,000 buildings, nearly 40,000 acres, some 8,500 military and civilian personnel engaged in research, management and support of approximately 20 missile and rocket programs.

Without the help of the new Technical Industrial Liaison Office headed by Emery Atkins, and created as part of the Army Materiel Command's aggressive policy of improving the acquisition process, newcomers to MICOM might have frustrating problems about the right place to go and the right person to see.

The "open door" to all MICOM research and development activities that may be of interest to industrial representatives is now located in Room A-129, Building 4505. A microfilm reader-

printer provides a rapid, comprehensive insight into what MICOM and the Army are doing, current needs, and current funding levels.

"We talk on a person-to-person basis," Atkins commented relative to the service provided for industrial representatives. "We can answer many questions in our office, but we also can steer those desiring more detailed information to the appropriate source." A small private room is set up to review information.

Stored on microfilm are a Catalog of Approved Requirements updated regularly, R&D policies and principles including planning summaries, Army planning information for the future, and funding. Atkins also serves as technical director of the Advanced Systems Concepts Office. He knows MICOM R&D programs, their current status, and who is doing what job.

The Technical Industrial Liaison Office was set up by instructions from MICOM Technical Director Dr. John L. McDaniel. Services are available to contractors with a proper security clearance.

CRREL Employee Participating In NASA Mars Flight Program

In NASA's Mars exploration program, which will be launched with Project Viking late in August, Dr. Duwayne M. Anderson of the U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH, is serving as a member of the Lander Molecular Analysis Team.

When the unmanned spacecraft reaches Mars, a lander vehicle will be separated for a landing scheduled for July 4, 1976.

Both the lander and the orbiting crafts will conduct studies of the Martian atmosphere and surface. While the orbiter performs television, thermal and water vapor mapping, the lander will conduct analyses in its immediate area of the Martian surface and its atmosphere.

The Lander Molecular Analysis Team has developed equipment and techniques that will enable the lander to perform a chemical analysis of the Martian atmosphere and soil. Composition of the atmosphere is important in understanding chemistry of the planet and in attempting to trace the history of its formation.

Both the atmospheric and soil analysis consists of detecting and identifying specific molecules by using a device called a gas chromatograph mass spectrometer. If living organisms have not evolved on Mars, the organic analysis may help explain and provide knowledge of prebiological organic chemical evolution.

Dr. Anderson is chief of CRREL's Earth Science Branch, and has been active in CRREL's programs in application of remote sensing techniques since he joined staff in 1963. Previously he was professor of Soils Physics at the University of Arizona. He received his BS degree in geology from Brigham Young University and a PhD in soil chemistry from Purdue University.